Mental Health and Substance Use Disorders in Patients Diagnosed With Cancer: An Integrative Review of Healthcare Utilization

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PROBLEM IDENTIFICATION: The impact of mental health disorders (MHDs) and substance use disorders (SUDs) on healthcare utilization (HCU) in patients with cancer is an understudied phenomenon.

LITERATURE SEARCH: A literature search of studies published prior to January 2018 that examined HCU in patients with preexisting MHDs or SUDs diagnosed with cancer was conducted.

DATA EVALUATION: The research team evaluated 22 studies for scientific rigor and examined significant trends in HCU, as well as types of the MHD, SUD, and cancer studied.

SYNTHESIS: The heterogeneity of HCU outcome measures, MHD, SUD, sample sizes, and study settings contributed to inconsistent study findings. However, study trends indicated higher rates of HCU by patients with depression and lower rates of HCU by patients with schizophrenia. In addition, the concept of HCU measures is evolving, addressing not only volume of health services, but also quality and efficacy.

IMPLICATIONS FOR RESEARCH: Oncology nurses are essential to improving HCU in patients with MHDs and SUDs because of their close connections with patients throughout the stages of cancer care. Additional prospective studies are needed to examine specific MHDs and different types of SUDs beyond alcohol use, improving cancer care and the effectiveness of HCU in this vulnerable population.

KEYWORDS substance use disorder; mental health disorder; cancer; comorbidities; healthcare utilization

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Approximately one in five adults in the United States are diagnosed with a mental health disorder (MHD) or a substance use disorder (SUD) annually (Substance Abuse and Mental Health Services Administration, 2017). More than 43 million adults in the United States live with MHDs. Among the 20 million adults in the United States with an SUD, 50% have a concurrent MHD (Substance Abuse and Mental Health Services Administration, 2015). MHDs and SUDs can have a significant effect on morbidity and mortality. MHDs and SUDs decrease life expectancy by 10 years and double the relative risk for mortality compared to those without MHDs or SUDs (Walker, McGee, & Druss, 2015). A meta-analysis by Singer, Das-Munshi, and Brähler (2010) found that, at the beginning of cancer treatment, 32% of patients with cancer also had a concurrent MHD or SUD. This is concerning because adults in the United States living with serious mental illness die, on average, 25 years earlier than adults without a serious mental illness, largely related to treatable physical comorbidities, including cancer (National Association of State Mental Health Program Directors Council, 2006). In addition, a systematic review of published studies from 1996 to 2006 found that, in patients with MHDs, the incidence of cancer remained consistent with the general population; however, once patients with MHDs were diagnosed with cancer, they had significantly higher mortality than people without MHDs or SUDs (De Hert et al., 2011; Leucht, Burkard, Henderson, Maj, & Sartorius, 2007).

In the general population, MHDs and SUDs are associated with increased healthcare utilization (HCU) (Fogarty, Sharma, Chetty, & Culpepper, 2008). MHDs and SUDs accounted for about 6% of all inpatient stays in the United States in 2014, an increase of 20% from 2005 (Mcdermott, Elixhauser, Sun, & Cost,

2017). In addition, in patients with SUDs, significant increases in HCU are noted for cardiovascular, respiratory, infectious diseases, injuries, and accidents with associated costs that are almost twice that of matched controls (De Weert-Van Oene, Termorshuizen, Buwalda, & Heerdink, 2017).

Researchers hypothesize that patients with MHDs and SUDs have significant differences in HCU from the general population because of alterations in help-seeking behaviors. These psychological and behavioral changes associated with MHDs and SUDs may affect adherence with oncologic treatment and HCU associated with physical comorbidities after cancer diagnosis (Damjanovic, Ivkovic, Jasović-Gasic, & Paunović, 2006). However, most of the research on MHDs and SUDs related to HCU is directed toward psychiatric- and substance-related hospitalization or emergency department visits and not on physical health or cancer care specifically (Heslin & Weiss, 2015).

HCU, specifically in patients with cancer, is a challenge for the healthcare system in the United States (Sambamoorthi, Tan, & Deb, 2015). Because of the increasing complexity of cancer treatment, coupled with the rise in the number of mental and physical chronic comorbidities, healthcare expenditures associated with HCU in cancer care are expected to exceed $170 billion in 2020, representing an estimated two-fold increase from 2010 cost estimates (Mariotto, Yabroff, Shao, Feuer, & Brown, 2011; Sarfati, Koczwara, & Jackson, 2016). A significant gap exists in the literature regarding how MHDs and SUDs specifically affect HCU in patients with cancer. The types of MHDs and SUDs, as well as different types of HCU, are not well described. Therefore, this integrative review questions the nature of the association between preexisting MHDs, SUDs, and HCU in patients with cancer. Study aims were as follows:

- Aim 1: Identify the conceptualization and operationalization of MHDs and SUDs in the context of cancer.
- Aim 2: Identify the conceptualization and operationalization of HCU of the outcome variables used to define HCU in the context of MHDs, SUDs, and cancer.
- Aim 3: Determine the association between preexisting MHDs or SUDs on HCU in patients with cancer.

Methods

Data Extraction

After consulting a health sciences librarian, the research team searched the MEDLINE®, CINAHL®, and PsycINFO® electronic databases. The literature search included *healthcare utilization, healthcare accessibility, mental disorders,* and *neoplasms* as Medical Subject Heading (MeSH) terms, as well as *substance use, mental, cancer, comorbidities, use of health services, admission, emergency, length of stay,* and *substance-related disorder* as additional search terms. Because reviewers found that MHDs and SUDs in patients with cancer is an understudied phenomenon, all studies published longitudinally prior to January 2018 were included in the review.

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines (Moher, Liberati, Tetzlaff, & Altman, 2009) directed the methodology of this integrative review. Prior to the initial literature search, investigators jointly adopted a plan for sampling the literature, article collection, and critical analysis of studies. The initial search produced 1,426 citations that were downloaded into a Microsoft Excel® spreadsheet for independent, manual review by two investigators. Investigators narrowed the search by candidate titles, then abstracts, and finally a full-text review of articles based on the inclusion and exclusion criteria. Investigators retained articles for abstract and full-text review if they met the inclusion and exclusion criteria. Throughout the process, two investigators (J.W. and J.V.C.) worked independently to evaluate each article and then met to discuss decisions and resolve differences. To ensure reliability and validity of the finding from the review, the two investigators independently documented rationale for decisions on article inclusion and exclusion in the Excel spreadsheet.

Inclusion and Exclusion Criteria

The inclusion criteria were as follows:

- Prospective and retrospective cohort, case-control, and cross-sectional studies published in peer-reviewed journals prior to January 2018
- Studies provided a definition or diagnostic criteria for the MHD studied that were present before the measure of HCU. MHDs were operationalized broadly as any neurocognitive, neurodevelopmental, and psychiatric disorders that fall within the 20 disorder chapters of the *Diagnostic and Statistical Manual of Mental Disorders, 5th edition* (*DSM-5*) (American Psychiatric Association, 2013) present in patients prior to measurement of HCU.
- Studies described patients diagnosed with cancer that used health services as a part of managing their cancer care and physical health.
- Studies provided a definition or diagnostic criteria for SUDs studied. SUDs were operationalized using

any preexisting alcohol misuse, alcohol abuse, and illicit or prescription drug use disorders that fall within substance and addictive disorders codes of the *DSM-5* (American Psychiatric Association, 2013).
- English language articles with adults aged 18 years or older
- Investigators operationalized HCU as all study outcome variables that are measures of the volume of health services in the context of physical health and cancer care (e.g., hospital stays lengthened because of complications from cancer treatment) based on Andersen's (1968, 2008) behavioral model of health services use.

The exclusion criteria were as follows:
- Articles in which HCU consisted solely of mental health or SUD treatment outside of the context of cancer care
- Articles that did not describe some form of diagnostic criterion or definition for a MHD or SUD
- Studies involving acute, organic delirium not associated with co-occurring chronic dementia that developed during the same time as the measurement of HCU

Investigators identified 1,426 relevant candidate titles and 87 abstracts for review, of which 37 studies underwent full-text review. Ultimately, 22 studies met inclusion and exclusion criteria (see Figure 1).

Quality Appraisal

Each study was examined for bias and other aspects of study quality using the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) criteria (Benchimol et al., 2015). A team of epidemiologists, methodologists, statisticians, researchers, and journal editors developed the STROBE checklist to improve the scientific rigor, scientific reporting, and internal and external validity of observational studies including cohort, case control, and cross-sectional study designs (Benchimol et al., 2015). The STROBE checklist includes 22 criteria for observational studies. A number of biomedical and cancer journals endorse the STROBE guidelines to improve the quality of scientific reporting for observational studies (Papathanasiou & Zintzaras, 2010). All 22 studies were observational, quantitative studies with moderate to high quality scores (see Table 1).

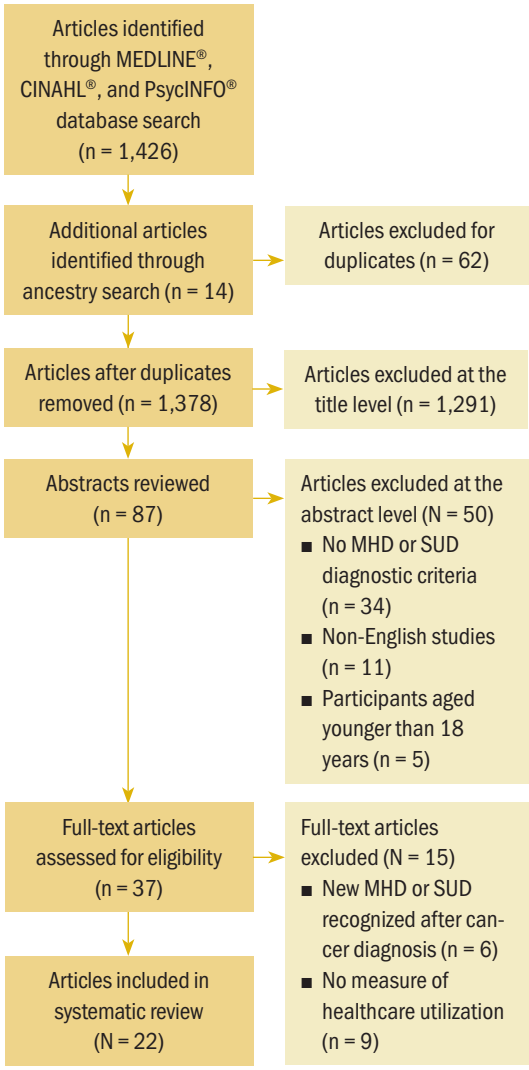
Results

Characteristics of Studies

This review identified 22 relevant studies. All studies used an observational study design with a convenience sample. Nineteen of 22 studies were retrospective with cohort, case-control, or cross-sectional study designs. Three studies were prospective cohort studies. Sample sizes ranged from 41 to 1,238,895 participants. The majority of studies used large federal, state, or health system databases or electronic health records (n = 16 studies) as their source of data, with more than half of the studies examining 10,000 or more participants.

In reviewing demographic traits of study participants, mean ages ranged from 38 to 89 years (Morin, Beaussant, Aubry, Fastbom, & Johnell, 2016; Spies et

FIGURE 1. PRISMA Diagram



MHD—mental health disorder; PRISMA—Preferred Reporting Items for Systematic Reviews and Meta-Analyses; SUD—substance use disorder

al., 1996); however, the majority of studies focused on participants who were middle aged or older (n = 16 studies). Both genders were equally represented, with some homogenous male or female samples related to the types of cancer studied (e.g., breast, prostate, gynecologic). Participants were predominantly Caucasian (n = 12 studies). Four studies were conducted in Japan and China (Aoyanagi, Iizuka, & Watanabe, 2007; Chang, Hou, et al., 2013; Chang, Kao, et al., 2013; Ishikawa, Yasunaga, Matsui, Fushimi, & Kawakami, 2016), and five studies did not report on race or ethnicity (Bhattarai, Charlton, Rudisill, & Gulliford, 2013; Ganzini, Socherman, Duckart, & Shores, 2010; Morin et al., 2016; Spies et al., 1996; Wancata, Benda, Windhaber, & Nowotny, 2001).

Types of cancer studied varied considerably. Four studies looked at neoplasms as a broad category, three of which were focused on hospice care (Ganzini et al., 2010; Legler, Bradley, & Carlson, 2011; Morin et al., 2016; Wancata et al., 2001). The most prevalent cancers studied were colon (n = 5 studies) (Aoyanagi et al., 2007; Bhattarai et al., 2013; Himelhoch, Weller, Wu, Anderson, & Cooper, 2004; Ishikawa et al., 2016; Wieghard, Hart, Herzig, Lu, & Tsikitis, 2015), head and neck (n = 4 studies) (Chang, Hou, et al., 2013; Chang, Kao, et al., 2013; Genther & Gourin, 2012; Spies et al., 1996), and breast cancer (n = 4 studies) (Farasatpour et al., 2013; Himelhoch et al., 2004; Mahabaleshwarkar et al., 2015; Zhang, Ivy, Payton, & Diehl, 2010). The only specific relationship between certain types of MHDs or SUDs and cancer was alcohol abuse in patients with head and neck cancer (n = 3 studies) (Chang, Kao, et al., 2013; Genther & Gourin, 2012; Spies et al., 1996).

TABLE 1. STROBE Quality Appraisal Score for Included Studies (N = 22)

Criterion	n
Title and abstract	22
Introduction, background, and rationale	22
Objectives	21
Methods and study design	22
Setting	22
Participants	22
Variables	20
Data source and measurement	22
Bias	15
Study size	13
Quantitative variables	21
Statistical methods	21
Results and participants	22
Descriptive data	10
Outcome data	13
Main results	21
Other analyses	21
Discussion and key results	22
Limitations	18
Interpretation	22
Generalizability	17
Funding and conflict of interest	16

STROBE—Strengthening Reporting of Observational Studies in Epidemiology
Note. All studies were observational, quantitative studies with moderate to high quality scores; the mean quality score was 19.3 out of 22.
Note. Based on information from Benchimol et al., 2015.

Aim 1

To operationalize MHDs and SUDs, the majority of studies (n = 20) used organizational diagnostic codes from the International Classification of Diseases developed by the World Health Organization and the *DSM-5* from the American Psychiatric Association (Deyo, Cherkin, & Ciol, 1992; Regier, Kuhl, & Kupfer, 2013). Studies identified an MHD or SUD either by direct collection of diagnostic codes or through designation by study investigators based on written patient history extracted from medical records. Two studies also used physician diagnoses from patients' records to classify MHDs (Nakayama, Ou, Friedman, Smolkin, & Duska, 2015; Spies et al., 1996).

Aim 2

The most common outcome measures used to operationalize HCU were length of stay, hospital admissions, emergency department visits, and outpatient visits. Table 2 contains a review of all outcome measures used to operationalize HCU. Two studies provided a definition for HCU. They used the terms *health services use* (Chhatre, Metzger, Malkowicz, Woody, & Jayadevappa, 2014) or *utilization of acute medical service* (Himelhoch et al., 2004). Of the two studies, Himelhoch et al. (2004) was the only study to create a conceptual model when defining HCU. The conceptual model demonstrated the bidirectional relationship between symptom burden of MHDs and other medical illness that is also influenced by the illness behaviors in patients with MHDs (Himelhoch et al., 2004).

Aim 3

Length of stay: Eleven studies examined length of stay. Five studies did not find a statistically significant

change in length of stay in patients with MHDs, SUDs, and cancer (Aoyanagi et al., 2007; Chang, Kao, et al., 2013; Farasatpour et al., 2013; Ishikawa et al., 2016; Wieghard et al., 2015). In addition, four studies (Ganzini et al., 2010; Genther & Gourin, 2012; Prieto et al., 2002; Spies et al., 1996) found an increase and two studies (Wancata et al., 2001; Zhang et al., 2010) found a decrease in length of stay.

The most common types of cancer studied included head and neck (n = 3 studies) (Chang, Kao, et al., 2013; Genther & Gourin, 2012; Spies et al., 1996) and gastric or colorectal (n = 3 studies) (Aoyanagi et al., 2007; Ishikawa et al., 2016; Wieghard et al., 2015). The most common type of MHD studied was all MHDs as a broad category (n = 4 studies) (Aoyanagi et al., 2007; Prieto et al., 2002; Wieghard et al., 2015) and schizophrenia (n = 3 studies) (Farasatpour et al., 2013; Ganzini et al., 2010; Ishikawa et al., 2016). The most common type of SUD studied was all SUDs as a broad category (n = 4 studies) (Aoyanagi et al., 2007; Wancata et al., 2001; Wieghard et al., 2015; Zhang et al., 2010) and alcohol use disorders (n = 3 studies) (Chang, Kao, et al., 2013; Genther & Gourin, 2012; Spies et al., 1996).

Hospital admissions: Ten studies focused on hospital admissions. Six of those studies found that hospital admissions increased in patients with MHDs and SUDs, with odds ratios ranging from 1.1 to 3.7 compared to patients without MHDs and SUDs (Chhatre et al., 2014; Himelhoch et al., 2004; Jayadevappa, Malkowicz, Chhatre, Johnson, & Gallo, 2012; Legler et al., 2011; Morin et al., 2016; Nakayama et al., 2015). In addition, two studies (Bhattarai et al., 2013; Mahabaleshwarkar et al., 2015) did not find a statistically significant change in hospital admissions. Bergamo, Sigel, Mhango, Kale, and Wisnivesky (2014) found a decrease in hospitalizations in patients with schizophrenia, and Piette, Barnett, and Moos (1998) found increases and decreases in hospital admissions depending on the type of cancer studied.

The most common type of cancer studied in relation to hospital admissions was prostate cancer (n = 3 studies) (Chhatre et al., 2014; Himelhoch et al., 2004; Jayadevappa et al., 2012). Depression (n = 3 studies) was the most common type of MHD studied and was primarily examined in studies that found an increase in hospital admissions in patients with cancer (Bhattarai et al., 2013; Himelhoch et al., 2004; Jayadevappa et al., 2012). SUDs focused on all SUDs as a broad category (n = 2 studies) (Mahabaleshwarkar et al., 2015; Nakayama et al., 2015) and alcohol use disorders (n = 1 study) (Piette et al., 1998). Chhatre et al. (2014) found an increase in hospital admissions and was the only study in the integrative review that specifically examined illicit drug use or prescriptive drug use disorders.

Emergency department visits: Seven studies examined emergency department visits. Five of those studies found that emergency department visits increased in patients with MHDs and SUDs, with odds ratios ranging from 1.2 to 4.5 compared to patients without MHDs and SUDs (Chhatre et al., 2014; Himelhoch et al., 2004; Jayadevappa et al., 2012; Legler et al., 2011; Morin et al., 2016). In addition, two studies examining lung and breast cancer found a decrease in emergency department visits in patients with schizophrenia and MHD studied as a broad category (Bergamo et al., 2014; Mahabaleshwarkar et al., 2015).

The most common type of cancer studied in relation to emergency department visits was prostate cancer (n = 3 studies) (Chhatre et al., 2014; Himelhoch et al., 2004; Jayadevappa et al., 2012). The most common type of MHDs studied were depression (n = 2 studies) (Himelhoch et al., 2004; Jayadevappa et al., 2012) and dementia (n = 2 studies) (Legler et al., 2011; Morin et al., 2016). Depression and dementia were examined in studies with an increase in emergency department visits. Chhatre et al. (2014) examined illicit drug use or prescriptive drug use disorders, and Mahabaleshwarkar et al. (2015) combined all SUDs with MHDs into a broad category for analysis.

Outpatient visits: Of the four studies that focused on outpatient visits, two found increases in outpatient visits in patients with MHDs, SUDs, and prostate cancer (Chhatre et al., 2014; Jayadevappa et al., 2012). The most common type of MHD studied was depression (n = 2 studies) (Bhattarai et al., 2013; Jayadevappa et al., 2012). All SUDs were studied as a broad category (Chhatre et al., 2014; Mahabaleshwarkar et al., 2015).

Other outcome measures: Other outcome measures identified included long-term facility use (n = 3 studies), general practitioner consultations (n = 1 study), transfer rates to other facilities (n = 1 study), and number of surgeries or invasive treatments (n = 2 studies) (Bergamo et al., 2014; Bhattarai et al., 2013; Chang, Hou, et al., 2013; Genther & Gourin, 2012; Ishikawa et al., 2016; Legler et al., 2011). In two studies of long-term care, facility use decreased in patients with schizophrenia and dementia during treatment for lung cancer and in hospice care (Bergamo et al., 2014; Legler et al., 2011). In two studies, the number of surgeries or invasive procedures for head and neck,

TABLE 2. MHDs, SUDs, and HCU Study Findings (N = 22)

Study	Objective	Design, Sample, and Disorder	Findings and Limitations
Length of stay increased			
Ganzini et al., 2010	To compare quality of end-of-life care between veterans with or without schizophrenia who died of cancer in the United States. Hospice length of stay (mean days) was analyzed.	Retrospective cohort study of 256 participants from 2003 to 2008; 60 had schizophrenia or schizoaffective disorder; 196 were randomly selected from a population of veterans without diagnosis of major mental illness.	**Findings:** Hospital length of stay increased. Patients with schizophrenia or schizoaffective disorder had longer mean hospice length of stay (107 days) than patients with no mental illness (63 days) ($p = 0.05$). **Limitations:** The study may have excluded patients with schizophrenia who were transient, not adherent to treatment, or not well integrated into the care system. In addition, the study had a small sample size.
Genther & Gourin, 2012	To determine the effect of alcohol abuse and withdrawal on in-hospital mortality, postoperative complications, length of stay, and hospital costs in patients undergoing head and neck cancer surgery. Length of stay (days) was analyzed.	Retrospective cross-sectional analysis from the National Inpatient Sample, Agency for Healthcare Research and Quality database from 2003 to 2008 (N = 92,312 participants). Focus was on alcohol abuse and alcohol withdrawal delirium.	**Findings:** Length of stay increased; 1.5 additional mean hospital days attributed to alcohol abuse (RR = 0.2057, 95% CI [0.14, 0.28]); 5.5 additional mean hospital days attributed to alcohol withdrawal (RR = 0.7365, 95% CI [0.66,0.81]) **Limitations:** Data limited to a 30-day postoperative window; lacks information about stage, grade, or subtype of head and neck cancer; incidence of alcohol abuse may be underreported.
Prieto et al., 2002	To determine the prevalence of psychiatric disorders during hospitalization for hematopoietic stem cell transplantation and estimate the effect of psychiatric disorders on hospital length of stay. Length of stay was analyzed.	Prospective, single institution cohort study from 1994 to 1997 (N = 220). Focus was on mood disorder, anxiety disorder, and adjustment disorder	**Findings:** Estimated increase in length of stay was 8% (95% CI [1%, 15%]). **Limitations:** Focused on limited range of psychiatric conditions, which were combined into one group; did not check for inter-rater reliability of psychiatric diagnoses; data abstractors were unblinded to length of stay.
Spies et al., 1996	To investigate whether ICU length of stay was prolonged in patients with chronic alcoholism following tumor resection of the upper digestive tract, and whether the incidence of pneumonia and sepsis increased	Prospective, single institution cohort study of 121 chronic alcoholics, 39 social drinkers, and 61 non-drinkers. Focus was on alcohol abuse	**Findings:** ICU length of stay increased; related to an increased incidence of pneumonia and sepsis, the ICU stay was significantly prolonged in chronic alcoholics by approximately 8 days ($p < 0.001$). **Limitations:** Small, single institution
Length of stay decreased			
Wancata et al., 2001	To investigate the influence of psychiatric illness on the length of stay (days) in nonpsychiatric hospital departments	Prospective cohort study of patients (N = 821) from inpatient medical, surgical, gynecologic, and physical rehabilitation departments. Focus was on dementia, organic mental illness, substance abuse disorders, alcohol and drug-related psychiatric disorders, major and minor depression, psychosomatic disorders, psychoses and bipolar, anxiety, and neurotic disorders	**Findings:** Inpatient length of stay decreased: all psychiatric diagnoses and patients with neoplasms (β = 0.83, 95% CI [0.72, 0.95]), dementia and neoplasms (β = 0.81, 95% CI [0.69, 0.94]), and depression and neoplasms (β = 0.81, 95% CI [0.7, 0.95]) **Limitations:** Generalizability of the study may be limited because care in the Austrian health system may differ from other national healthcare systems.

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TABLE 2. MHDs, SUDs, and HCU Study Findings (N = 22) *(Continued)*

Study	Objective	Design, Sample, and Disorder	Findings and Limitations
Length of stay decreased *(continued)*			
Zhang et al., 2010	To model the effect of comorbidities on patients with breast cancer. Length of stay (days) was analyzed.	Retrospective cohort study using the National Inpatient Sample, Agency for Healthcare Research and Quality database in 2006: prevalence of breast cancer diagnosis (n = 161,161), primary diagnosis of breast cancer (n = 21,598), and mental disorder (n = 2,109,840). Focus was on various mental disorders.	**Findings:** Length of stay decreased. For breast cancer-related hospitalizations, mental disorders decreased in length of stay by 19.7% ($p < 0.0001$). **Limitations:** Use of deidentified data prevented conclusive identification of duplicate participants; no information on preexisting medical conditions; did not control for comorbid conditions
No significant change in length of stay			
Aoyangi et al., 2007	The effect of comorbid psychiatric disorders on outcome of surgery for hepatic, gastric, and colorectal malignancies were analyzed, as was hospital length of stay (days).	Retrospective cohort study (N = 568) in Japan from 1998 to 2006: groups were no psychiatric disorder (n = 482) and psychiatric disorder (n = 86). Focus was on schizophrenia, mood disorders, organic mental disorders, neurotic disorder, intellectual disability, and disorders related to psychoactive substance.	**Findings:** No significant difference with and without psychiatric disorders in hospital length of stay ($p = 0.43$) **Limitations:** Small, single-institution sample
Chang, Kao, et al., 2013	To clarify the clinical manifestations and influences of non–alcohol-related neuropsychological problems and AWS in patients undergoing ablation treatment for head and neck cancer with microvascular free flap transfer surgery. ICU and hospital length of stay (days) were analyzed.	Retrospective, single institution, cross-sectional study of 41 participants from 2006 to 2008. Focus was on AWS (n = 12) and ICU neurologic disorder (n = 29).	**Findings:** No significant difference noted in ICU or overall hospital length of stay between AWS and non-AWS ($p = 0.938$) **Limitations:** Poor diagnostic criterion for the non-AWS neuropsychological problem; small, single-institution sample
Farasatpour et al., 2013	To estimate how the presence of schizophrenia disrupts the course of diagnosis and initial treatment of breast cancer. Postoperative length of stay (days) was analyzed.	Retrospective cohort study from 34 VA facilities; 56 participants had schizophrenia or schizoaffective disorder, and 478 participants were in the control group.	**Findings:** No statistically significant difference in postoperative length of stay **Limitations:** Small sample size; limited to VA; lacks comparative statistical analyses
Ishikawa et al., 2016	To investigate the likelihood of early diagnosis and treatment in patients with schizophrenia who have cancer and their prognosis. Length of stay (days) was analyzed.	Retrospective matched-pair cohort study from a national inpatient database in Japan from 2010 to 2013; 2,495 patients with diagnosis of schizophrenia were enrolled in the case group and 9,980 patients without any diagnosis of psychiatric disorders were in the control group.	**Findings:** No significant difference in median length of stay **Limitations:** Study participants may have had less advanced cancer than all the patients with cancer who had schizophrenia in Japan, resulting in underestimation of the potential disparity in treatments. Some factors that can affect treatment outcome were not included in the statistical model.

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TABLE 2. MHDs, SUDs, and HCU Study Findings (N = 22) *(Continued)*

Study	Objective	Design, Sample, and Disorder	Findings and Limitations
No significant change in length of stay *(continued)*			
Wieghard et al., 2015	To determine whether patients with rectal cancer with psychiatric diagnoses have fewer sphincter-preserving procedures and higher postoperative complications. Length of stay (days) was analyzed.	Retrospective cohort study from the National Inpatient Sample, Agency for Healthcare Research and Quality all-payer database from 2004 to 2011; 19,051 patients with psychiatric diagnosis and 4,862 patients with no psychiatric diagnosis were included. Additional focus was on anxiety disorders, mood disorders, schizophrenia, other psychotic disorders, substance abuse, and dependence disorders.	**Findings:** No significant difference in median length of stay with or without psychiatric diagnosis (p = 0.67) **Limitations:** No tumor staging, neoadjuvant treatment, or height of tumor in rectum data; no data on surgeon decision making or patient social support status
Increased hospital admissions			
Chhatre et al., 2014	To analyze the effects of the timing and type of SUD on health services use, cost of care, and mortality in older adult Medicare recipients with advanced prostate cancer. Number of inpatient hospitalizations were analyzed.	Retrospective cohort study using SEER database from 2000 to 2009 (N = 14,227). Focus was on alcoholic psychosis, drug psychoses, alcohol dependence syndrome, drug dependence, and non-dependent use of drugs.	**Findings:** Number of inpatient hospitalizations increased. For alcohol dependence, OR = 1.9 (95% CI [1.6, 2.3]); for drug psychoses and related, OR = 2.3 (95% CI [1.9, 2.8]); for non-dependent use of drugs, OR = 1.7 (95% CI [1.6, 1.8]) **Limitations:** Study population limited to people aged 66 years or older who lived in a SEER region and were fee-for-service and, therefore, may not be representative of the national population.
Jayadevappa et al., 2012	To analyze the prevalence and incremental burden of depression among older adults with prostate cancer. Number of inpatient visits were analyzed.	Retrospective cohort study using the SEER database from 1995 to 2003; 45,862 were in the no-depression group and 4,284 were in the depression group	**Findings:** Number of inpatient visits increased (OR = 3.22, 95% CI [3.08, 3.37]). **Limitations:** Population was limited to men aged 66 years or older, not enrolled in a health maintenance organization, and living in a SEER region.
Himelhoch et al., 2004	To examine whether the comorbid diagnosis of a depressive syndrome was associated with a higher and acute inpatient hospitalization or a preventable inpatient hospitalization from ambulatory care sensitive conditions (ACSC) during the same calendar year.	Retrospective cross-sectional study from Medicare Standard Analytic Files in 1999; 60,382 participants with depressive symptoms out of a total sample of 238,895. Focus was on depression.	**Findings:** Inpatient hospitalization increased. For all groups with no depression, OR = 1.00. For colon cancer, depression OR = 3.71 (95% CI [3.08, 4.47]); for breast cancer, depression OR = 3.16 (95% CI [2.84, 3.52]); for lung cancer, depression OR = 3.31 (95% CI [2.75, 3.99]); for prostate cancer, depression OR = 3.59 (95% CI [3.22, 4]). In addition, ACSC inpatient hospitalization increased. For colon cancer, depression OR = 2.68 (95% CI [3.23, 3.22]); for breast cancer, depression OR = 2.31 (95% CI [1.97, 2.71]); for lung cancer, depression OR = 2.32 (95% CI [2.01, 2.67]); for prostate cancer, depression OR = 2.57 (95% CI [2.24, 2.96]) **Limitations:** Potential for unmeasured confounding and misclassification of depression

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TABLE 2. MHDs, SUDs, and HCU Study Findings (N = 22) *(Continued)*

Study	Objective	Design, Sample, and Disorder	Findings and Limitations
Increased hospital admissions *(continued)*			
Legler et al., 2011	To estimate the comorbidity burden of hospice users with a primary diagnosis of cancer and the association between comorbidity burden and emergency department admission, ICU admission, inpatient hospitalization, hospice disenrollment, and hospital death	Retrospective cross-sectional study of 27,166 participants from the SEER database in 2002. Focus was on dementia.	**Findings:** Hospitalized as an inpatient increased (OR = 1.2, 95% CI [1.05, 1.4]) **Limitations:** Does not evaluate the comorbidity burden of hospice users with a non-cancer primary diagnosis; study lacks generalizability because the sample does not include individuals in a Medicare-managed care organization
Morin et al., 2016	To compare the aggressiveness of cancer care near the end of life in patients with and without dementia. Number of hospitalizations were analyzed.	Retrospective cohort study from a nationwide register database in France from 2010 to 2013; matched pairs (N = 26,782) were investigated. Focus was on dementia.	**Findings:** Number of hospitalizations increased (OR = 1.42, 95% CI [1.37, 1.48]). **Limitations:** Results were limited to individuals who died in hospitals and, therefore, may not be generalizable to patients in nursing homes or hospice. In addition, there was potential underestimation of the incidence and severity of dementia in a retrospective review of a hospital registry.
Nakayama et al., 2015	To identify risk factors for postoperative readmission in patients treated by a gynecologic oncology service. Unplanned hospital readmission was analyzed.	Retrospective single-institution case-control study from 2007 to 2013, with 166 in the case group and 168 in the control group. Focus was on depression, anxiety, bipolar disorder, and substance abuse.	**Findings:** Unplanned hospital readmission increased (OR = 1.8, 95% CI [1.06, 3.04]). **Limitations:** Small, single-institution sample
Decreased hospital admissions			
Bergamo et al., 2014	To examine disparities in lung cancer diagnosis, evaluation, treatment, and survival in older adult patients with schizophrenia. Number of hospitalizations was analyzed.	Retrospective cohort study using SEER database from 1992 to 2007. 96,702 total participants were examined (1,303 with schizophrenia and 95,399 without schizophrenia).	**Findings:** Number of hospitalizations decreased (OR = 0.59, 95% CI [0.41, 0.85]). **Limitations:** Did not evaluate for smoking history; unable to identify the underlying reasons for suboptimal evaluation and treatment of patients with schizophrenia
Increased and decreased hospital admissions			
Piette et al., 1998	To estimate the rate of first-time hospital admission over 10 years with alcohol-related medical problems among a large national sample of patients with diagnosed alcohol abuse disorders	Retrospective cohort study from VA acute care hospitals in 1980; alcoholic patients (N = 46,680) and two control groups of patients with musculoskeletal or tissue disorders (n = 18,231) and no alcohol or drug abuse (n = 45,204)	**Findings:** First-time hospital admission rates increased and decreased. For musculoskeletal group, all RR = 1.00. For liver cancer, RR = 2.8 (95% CI [1.3, 6.2]); for esophageal cancer, RR = 3.2 (95% CI [2.1, 4.9]); for stomach cancer, RR = 1.4 (95% CI [0.8, 2.4]); for melanoma, RR = 0.8 (95% CI [0.7, 0.9]); for leukemia, RR = 0.3 (95% CI [0.2, 0.4]) **Limitations:** Study was limited to veterans and almost exclusively male. An unknown portion of each cohort may have received care outside of the VA system or have been lost to follow-up.

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TABLE 2. MHDs, SUDs, and HCU Study Findings (N = 22) *(Continued)*

Study	Objective	Design, Sample, and Disorder	Findings and Limitations
No significant change			
Bhattari et al., 2013	To determine whether depression in patients with long-term conditions is associated with the number of comorbidities or the type of comorbidity. Inpatient episodes were analyzed.	Population-based retrospective cohort study using the UK General Practice Research database (GPRD) from 2005 to 2009 containing a random sample of 299,912 participants aged 30 to 100 years. Focus was on depression.	**Findings:** No statistically significant change in inpatient episodes **Limitations:** Study may include surveillance bias where repeat visits to healthcare providers for long-term illness may offer more opportunities to make a depression diagnosis; sample was limited to primary care settings and, therefore, results may not be generalizable to other settings, such as specialist clinics.
Mahabaleshwarker et al., 2015	To determine the effect of preexisting mental illnesses on guideline-consistent breast cancer treatment and breast cancer-related HCU. Inpatient visits were analyzed.	Retrospective cohort study of Medicaid enrollees (N = 2,142) from 2006 to 2008. Focus was on mood disorders, psychotic disorders, substance abuse and dependence, and other mental disorders	**Findings:** Impact of preexisting mental illnesses on breast cancer–related inpatient visits was not statistically significant. **Limitations:** Possible coding errors during processing of administrative claims; did not include individuals enrolled in both Medicare and Medicaid; algorithms to identify incident cases of breast cancer and cancer stage have not been validated in a Medicaid population; mental illnesses were identified using medical claims data and ICD-9-CM codes, which might have underestimated the true prevalence.
Emergency department visits increased			
Chhatre et al., 2014	To analyze the effects of the timing and type of SUD on health services use, cost of care, and mortality in older adult Medicare recipients with advanced prostate cancer. Number of inpatient hospitalizations were analyzed.	Retrospective cohort study using SEER database from 2000 to 2009 (N = 14,227). Focus was on alcoholic psychosis, drug psychoses, alcohol dependence syndrome, drug dependence, and nondependent use of drugs.	**Findings:** Emergency department visits increased. For drug psychoses and related, OR = 1.7 (95% CI [1.2, 2.4]); for nondependent use of drugs, OR = 1.5 (95% CI [1.3, 1.7]) **Limitations:** Study population was limited to people aged 66 years or older who lived in a SEER region and were fee-for-service; therefore, it may not be representative of the national population.
Himelhoch et al., 2004	To examine whether the comorbid diagnosis of a depressive syndrome was associated with a higher and acute inpatient hospitalization or a preventable inpatient hospitalization from ambulatory care sensitive conditions during the same calendar year. Emergency department visits were analyzed.	Retrospective cross-sectional study from Medicare Standard Analytic Files in 1999; 60,382 participants with depressive symptoms out of a total sample of 238,895	**Findings:** Emergency department visits increased. For all groups, depression OR = 1.00. For colon cancer, depression OR = 3.16 (95% CI [2.7, 3.71]); for breast cancer, depression OR = 2.76 (95% CI [2.48, 3.07]); for lung cancer, depression OR = 2.12 (95% CI [1.83, 2.45]); for prostate cancer, depression OR = 2.76 (95% CI [2.49, 3.07]) **Limitations:** Potential for unmeasured confounding and misclassification of depression status

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TABLE 2. MHDs, SUDs, and HCU Study Findings (N = 22) *(Continued)*

Study	Objective	Design, Sample, and Disorder	Findings and Limitations
Emergency department visits increased *(continued)*			
Jayadevappa et al., 2012	To analyze the prevalence and incremental burden of depression among older adults with prostate cancer. Number of emergency department visits were analyzed.	Retrospective cohort study using the SEER database from 1995 to 2003; no depression group (n = 45,862) and depression group (n = 4,285)	**Findings:** Emergency department visits increased (OR = 4.45, 95% CI [4.13, 4.8]). **Limitations:** Population was limited to men aged 66 years or older, not enrolled in a health maintenance organization, and living in an SEER region
Legler et al., 2011	To estimate the comorbidity burden of hospice users with primary diagnosis of cancer and the association between comorbidity burden and emergency department admission, ICU admission, inpatient hospitalization, hospice disenrollment, and hospital death	Retrospective, cross-sectional study of 27,166 patients from the SEER database in 2002. Focus was on dementia.	**Findings:** Emergency department visits increased (OR = 1.26, 95% CI [1.12, 1.41]). **Limitations:** Does not evaluate the comorbidity burden of hospice users with a non-cancer primary diagnosis; study lacks generalizability and sample does not include individuals in a Medicare-managed care organization.
Morin et al., 2016	To compare the aggressiveness of cancer care near the end of life in patients with and without dementia. Number of emergency department visits were analyzed.	Retrospective cohort study from a nationwide register database in France from 2010 to 2013 consisting of 26,782 matched pairs. Focus was on dementia.	**Findings:** Emergency department admissions increased (OR = 1.22, 95% CI [1.12, 1.34]). **Limitations:** Results were limited to individuals who died in hospitals and, therefore, may not be generalizable to patients in nursing homes or hospice. Potential underestimation of the incidence and severity of dementia in a retrospective review of a hospital registry
Emergency department visits decreased			
Bergamo et al., 2014	To examine disparities in lung cancer diagnosis, evaluation, treatment, and survival in older adult patients with schizophrenia. Number of emergency department visits were analyzed.	Retrospective cohort study using SEER database from 1992 to 2007. 96,702 total participants were examined (1,303 with schizophrenia and 95,399 without schizophrenia).	**Findings:** Emergency department visits decreased (OR = 0.59, 95% CI [0.4, 0.87]). **Limitations:** Did not evaluate for smoking history; unable to identify the underlying reasons for suboptimal evaluation and treatment of patients with schizophrenia
Mahabaleshwarker et al., 2015	To determine the impact of preexisting mental illnesses on guideline-consistent breast cancer treatment and breast cancer-related HCU. Number of emergency department visits were analyzed.	Retrospective cohort study of Medicaid enrollees (N = 2,142) from 2006 to 2008. Focus was on mood disorders, psychotic disorders, substance abuse and dependence, and other mental disorders.	**Findings:** Emergency department visits decreased (any mental illness, IRR = 0.842, 95% CI [0.709, 0.999]). **Limitations:** Possible coding errors during processing of administrative claims; did not include individuals enrolled in both Medicare and Medicaid; algorithms to identify incident cases of breast cancer and cancer stage have not been validated in a Medicaid population; mental illnesses were identified using medical claims data and ICD-9-CM codes, which might have underestimated the true prevalence.

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TABLE 2. MHDs, SUDs, and HCU Study Findings (N = 22) *(Continued)*

Study	Objective	Design, Sample, and Disorder	Findings and Limitations
Outpatient visits increased			
Chhatre et al., 2014	To analyze the effects of the timing and type of SUD on health services use, cost of care, and mortality in older adult Medicare recipients with advanced prostate cancer. Number of outpatient hospitalizations were analyzed.	Retrospective cohort study using SEER database from 2000 to 2009 (N = 14,227). Focus was on alcoholic psychosis, drug psychoses, alcohol dependence syndrome, drug dependence, and nondependent use of drugs	**Findings:** Outpatient hospital visits increased. For alcohol dependence, OR = 1.8 (95% CI [1.4, 2.2]); for drug psychoses and related, OR = 2.6 (95% CI [1.9, 3.6]); for nondependent use of drugs, OR = 1.8 (95% CI [1.6, 2]) **Limitations:** Study population limited to those aged 66 years or older who lived in a SEER region and were fee-for-service; therefore, it may not be representative of the national population.
Jayadevappa et al., 2012	To analyze the prevalence and incremental burden of depression among older adults with prostate cancer. Number of outpatient visits were assessed.	Retrospective cohort study using the SEER database from 1995 to 2003; 45,862 were in the no depression group and 4,284 were in the depression group.	**Findings:** Outpatient visits decreased (OR = 1.71, 95% CI [1.67, 1.75]). **Limitations:** Population was limited to men aged 66 years or older, not enrolled in a health maintenance organization, and living in a SEER region.
Outpatient visits decreased			
Mahabaleshwarker et al., 2015	To determine the effect of preexisting mental illnesses on guideline-consistent breast cancer treatment and breast cancer–related HCU. Outpatient visits were analyzed.	Retrospective cohort study of Medicaid enrollees (N = 2,142) from 2006 to 2008. Focus was on mood disorders, psychotic disorders, substance abuse and dependence, and other mental disorders.	**Findings:** Outpatient visits decreased. For mood disorders, IRR = 0.927 (95% CI [0.897, 0.958]); for psychotic disorders, IRR = 0.829 (95% CI [0.784, 0.877]); for substance abuse, IRR = 0.915 (95% CI [0.866, 0.966]); for other mental disorders, IRR = 0.926 (95% CI [0.894, 0.958]) **Limitations:** Possible coding errors during processing of administrative claims; did not include individuals enrolled in both Medicare and Medicaid; algorithms to identify incident cases of breast cancer and cancer stage have not been validated in a Medicaid population; and mental illnesses were identified using medical claims data and ICD-9-CM codes, which might have underestimated the true prevalence.
No significant change in outpatient visits			
Bhattari et al., 2013	To determine whether depression in patients with long-term conditions is associated with the number of comorbidities or the type of comorbidity. Outpatient episodes was analyzed.	Population-based retrospective cohort study using the UK General Practice Research database (GPRD) from 2005 to 2009 containing a random sample of 299,912 participants, aged 30 to 100 years. Focus was on depression.	**Findings:** No statistically significant change in outpatient episodes **Limitations:** Study may include surveillance bias where repeat visits to healthcare providers for long-term illness may offer more opportunities to make a depression diagnosis; sample limited to primary care settings; therefore, results may not be generalizable to other settings, such as specialist clinics.

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TABLE 2. MHDs, SUDs, and HCU Study Findings (N = 22) *(Continued)*

Study	Objective	Design, Sample, and Disorder	Findings and Limitations
Long-term facility use increased			
Genther & Gourin, 2012	To determine the effect of alcohol abuse and withdrawal on in-hospital mortality, postoperative complications, length of stay, and hospital costs in patients undergoing head and neck cancer surgery. Home HCU was analyzed.	Retrospective cross-sectional analysis from the National Inpatient Sample, Agency for Healthcare Research and Quality database from 2003 to 2008 (N = 92,312 participants). Focus was on alcohol abuse and alcohol withdrawal delirium.	**Findings:** Home HCU increased. For alcohol abuse, RR = 1.4 (95% CI [1.16, 1.68]); for alcohol withdrawal syndrome, RR = 2.77 (95% CI [2.05, 3.75]) **Limitations:** Data limited to 30-day postoperative window; lacks information about stage, grade, or subtype of head and neck cancer; incidence of alcohol abuse may be underreported.
Long-term facility use decreased			
Bergamo et al., 2014	To examine disparities in lung cancer diagnosis, evaluation, treatment, and survival in older adult patients with schizophrenia. Long-term care facility use was analyzed.	Retrospective cohort study using SEER database from 1992 to 2007. 96,702 total participants were examined (1,303 with schizophrenia and 95,399 without schizophrenia).	**Findings:** Long-term care facility use decreased (OR = 0.62, 95% CI [0.38, 0.99]). **Limitations:** Did not evaluate for smoking history; unable to identify the underlying reasons for suboptimal evaluation and treatment of patients with schizophrenia
Legler et al., 2011	To estimate the comorbidity burden of hospice users with primary diagnosis of cancer and the association between comorbidity burden and emergency department admission, ICU admission, inpatient hospitalization, hospice disenrollment, and hospital death	Retrospective, cross-sectional study of 27,166 patients from the SEER database in 2002. Focus was on dementia.	**Findings:** Disenrollment from hospice decreased (OR = 1.18, 95% CI [1.05, 1.32]). **Limitations:** Does not evaluate the comorbidity burden of hospice users with a non-cancer primary diagnosis; study lacks generalizability because sample does not include individuals in a Medicare-managed care organization.
General practitioner consults increased			
Bhattari et al., 2013	To determine whether depression in patients with long-term conditions is associated with the number of comorbidities or the type of comorbidity. General practitioner consultations were analyzed.	Population-based retrospective cohort study using the UK General Practice Research database (GPRD) from 2005 to 2009 containing a random sample of 299,912 participants aged 30 to 100 years. Focus was on depression.	**Findings:** General practitioner consultations increased. For men, 16 were not depressed (95% CI [9, 23]) and 26 were depressed (95% CI [16, 36]); for women, 19 were not depressed (95% CI [10, 28]) and 26 were depressed (95% CI [17, 36]) **Limitations:** Study may include surveillance bias where repeat visits to healthcare providers for long-term illness may offer more opportunities to make a depression diagnosis; sample limited to primary care settings and, therefore, results may not be generalizable to other settings, such as specialist clinics.
Number of surgeries or invasive procedures decreased			
Chang, Hou, et al., 2013	To investigate differences in treatment type and survival rates between patients with oral cancer with and without mental illness	Retrospective cohort study of Taiwan's National Health Insurance database from 2002 to 2006; sample included 206 with mental illness and 16,481 without mental illness.	**Findings:** Likelihood of surgery with or without adjuvant therapy decreased (OR = 0.47, 95% CI [0.34, 0.65]). **Limitations:** No data on cancer stage and pattern of relapse

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TABLE 2. MHDs, SUDs, and HCU Study Findings (N = 22) *(Continued)*

Study	Objective	Design, Sample, and Disorder	Findings and Limitations
Number of surgeries or invasive procedures decreased *(continued)*			
Ishikawa et al., 2016	To investigate the likelihood of early diagnosis and treatment in patients with schizophrenia who have cancer and their prognosis	Retrospective matched-pair cohort study from a national inpatient database in Japan from 2010 to 2013. The case group consisted of patients with schizophrenia diagnosis (n = 2,495), and the control group consisted of patients without any diagnosis of psychiatric disorders (n = 9,980).	**Findings:** Undergoing surgical or endoscopic treatment decreased. For schizophrenia, 56.5%; for control group, 70.2% (OR = 0.77, 95% CI [0.69, 0.85]) **Limitations:** Study participants might have less advanced cancer than all patients with cancer with schizophrenia in Japan, resulting in underestimation of the potential disparity in treatments; some factors that can affect treatment outcome were not included in the statistical model.
Transfers rates to other facilities increased			
Genther & Gourin, 2012	To determine the effect of alcohol abuse and withdrawal on in-hospital mortality, postoperative complications, length of stay, and hospital costs in patients undergoing head and neck cancer surgery	Retrospective cross-sectional analysis from the National Inpatient Sample, Agency for Healthcare Research and Quality database from 2003 to 2008 (N = 92,312 participants). Focus was on alcohol abuse and alcohol withdrawal delirium.	**Findings:** Transfers to other facilities increased. For alcohol abuse, RR = 1.87 (95% CI [1.41, 2.48]); for alcohol withdrawal syndrome, RR = 5.08 (95% CI [3.15, 7.33]) **Limitations:** Data limited to 30–day postoperative window; lacks information about stage, grade, or subtype of head and neck cancer; incidence of alcohol abuse may be underreported.

AWS—alcohol withdrawal syndrome; CI—confidence interval; HCU—healthcare utilization; ICU—intensive care unit; IRR—incident rate ratio; MHD—mental health disorder; OR—odds ratio; RR—relative risk; SEER—Surveillance Epidemiology and End Results; SUD—substance use disorder; VA—Veterans Affairs

gastric, and colorectal cancer decreased in patients with schizophrenia (Chang, Hou, et al., 2013; Ishikawa et al., 2016). Bhattari et al. (2013) found an increase in general practitioner consultations in patients with depression and colorectal cancer. Genther and Gourin (2012) examined patients with head and neck cancer and found an increase in home HCU and transfer rates to other facilities in patients with alcohol use disorders.

Discussion

This review examined 22 studies and found that, across all cancers, outcomes for HCU in patients with MHDs and SUDs were inconsistent, with both increases and decreases of HCU. The heterogeneity of HCU outcome measures, MHDs, SUDs, sample sizes, and study settings can all contribute to inconsistent study findings. Although hospital admission rates and length of stay were common measures of HCU, the authors counted eight different measures of HCU. Therefore, standardized measures of HCU are needed to determine the nature of the association between preexisting MHDs or SUDs and HCU in patients with cancer.

Policy initiatives regarding insurance reimbursement may create barriers to standardized HCU measures with the use of new outcome measures focused on value in health care. Health payers will increasingly use value-based programs to determine insurance reimbursement policies across the entire healthcare delivery system, evaluating multiple providers and settings as a single episode of patient care (Agency for Healthcare Research and Quality, 2016; National Quality Forum, 2009; Van Cleave, Smith-Howell, & Naylor, 2016). The Centers for Medicare and Medicaid Services (2018) has implemented seven value-based programs, each using new HCU measures as opposed to traditional fee-for-service payments (Agency for Healthcare Research and Quality, 2016; Fried & Sherer, 2016). In addition, in an effort to address quality in health care, large data projects, such as the Agency for Healthcare Research and Quality's Healthcare Cost and Utilization Project

and the National Quality Forum's Cost and Resource Use Measures project, are also changing the way HCU is operationalized. HCU is increasingly measured using outcome measures for quality, including healthcare safety, timeliness, effectiveness, equity, and patient-centeredness when examining HCU rather than volume of health services alone (Farquhar, 2008; National Quality Forum, 2010). Based on this evidence, future researchers may develop standardized outcome measures for HCU that also reflect quality in healthcare delivery and cost effectiveness in cancer care.

In this review, nine studies combined MHDs into a single category for statistical analysis. This combination of MHDs has important research implications in that prevalence rates of specific MHDs and SUDs may confound study findings. For example, this integrative review suggests that depression was associated with increased hospitalization, whereas schizophrenia was associated with decreased hospitalization. Prevalence rates for depression in patients with cancer are higher than other forms of MHDs, ranging from 8% to 24% (Krebber et al., 2014). The global prevalence rate of schizophrenia ranges from 0.3% to 0.7%, and the incidence rate of cancer in patients with schizophrenia ranges from 0.79% to 0.9% (Catts, Catts, O'Toole, & Frost, 2008; Lie et al., 2015). Therefore, study findings regarding HCU could change depending on the prevalence rates of specific MHDs and SUDs included in study samples.

In addition, the unique symptomatology of specific types of MHDs and SUDs may influence the overall relationship with HCU. For example, higher rates of HCU in patients with depression may be attributed to some aspects of symptom amplification present in patients with depression, including greater awareness of somatic, physical symptoms reported to healthcare providers (Kapfhammer, 2006). In addition, the relationship between depression and certain types of cancer has been investigated as a reciprocal interaction where several studies suggest depression is an early indicator of poor cancer survival and increased HCU (Mayr & Schmid, 2010). In contrast, the symptomatology of schizophrenia involves acute psychotic exacerbations and cognitive deficits involving verbal memory, attention, and executive function (Irwin, Henderson, Knight, & Pirl, 2014). Cognitive deficits in patients with schizophrenia have been shown to impair patients' ability to live independently and make navigating complex treatment regimens for cancer difficult (Green, Kern, & Heaton, 2004; Irwin et al., 2014). Therefore, cognitive deficits associated with schizophrenia may negatively affect HCU, and specific symptomatology unique to each MHD may affect study results.

KNOWLEDGE TRANSLATION

- The unique clinical symptomatology of mental health disorders (MHDs) and substance use disorders (SUDs) can influence healthcare utilization (HCU) in patients with cancer.
- Patients with MHDs and SUDs may require additional mental health and cancer screening to ensure they receive adequate assistance navigating the complexities of cancer care.
- Oncology nurses are essential to addressing HCU in patients with MHDs and SUDs because of their direct patient contact throughout the multiple stages of care.

Another finding regarding MHDs from the current review was the lack of studies focused on neurocognitive disorders, with only three studies focused on dementia (Legler et al., 2011; Morin et al., 2016; Wancata et al., 2001) and one study focused on neurodevelopmental delays (Aoyanagi et al., 2007). The prevalence of dementia is estimated to be around 6% in people aged older than 65 years and 30% in people aged older than 90 years (Butler, 2014). With an aging global population, the number of people living with dementia is expected to almost double from 35.7 to 65.7 million in 2030 (Prince et al., 2013). Age is a risk factor for a number of cancers, and estimates indicate that, by 2030, 67% of all cancer diagnoses will occur in patients aged 65 years or older (Smith, Smith, Hurria, Hortobagyi, & Buchholz, 2009). Dementia can lead to altered decision-making capacity that can have significant consequences regarding the ability to process information and manage the intricacies of cancer treatment, altering HCU and health outcomes (Karuturi et al., 2016). Therefore, additional research is needed to focus on neurocognitive and neurodevelopmental disorders, including dementia, and their unique relationships with HCU.

When examining SUDs, researchers focused primarily on alcohol use disorders, with only one study specifically examining illicit drug or prescription drug use disorders (Chhatre et al., 2014). A number of prominent research studies illustrate the strong association between alcohol consumption and several types of cancer, including oral cavity, pharynx, larynx, esophageal, liver, breast, and colorectal cancers (Baan et al., 2007; Secretan et al., 2009). In contrast, the relationship between illicit drug and prescription drug use disorders and cancer is an understudied area of research. Patients with cancer have unique risk

factors for SUDs and are a part of an aging population in which the number of patients with SUDs undergoing cancer treatment is rising (Paice, 2018). In light of the growing opioid crisis, oncology providers should expect that HCU in patients with cancer increasingly includes management of illicit drug and prescription drug use disorders (Paice, 2018). Consequently, additional research is needed to understand the relationship between prescriptive drug use and other drug use disorders as an emerging health risk for patients with cancer. Oncology nurses need to incorporate new policies in their practice for assessing risk factors for SUDs and managing cancer pain for patients with current and past SUDs (Paice, 2018).

Finally, this review contributes to the literature regarding increased morbidity and mortality in patients with MHDs and SUDs. In addition to HCU outcomes, the majority of studies also identified negative health outcomes as a part of their study findings. Patients with MHDs, SUDs, and cancer were more likely to undergo major surgery, require more invasive surgery, have more medical and surgical complications during hospital admissions, accrue higher healthcare costs, and have greater mortality than controls (Chhatre et al., 2014; Genther & Gourin, 2012; Ishikawa et al., 2016; Spies et al., 1996). Therefore, additional HCU research is needed to identify evidence-based clinical initiatives and treatments tailored to improving cancer care for patients with MHDs and SUDs.

Limitations

All 22 studies were observational, quantitative studies with moderate to high STROBE quality scores. However, the research team identified limitations within the literature. The majority of studies in this review were retrospective with nonrandomized samples where there is a potential for bias. Five studies collected data from single hospitals, which increases the risk of selection bias in recruitment of participants and decreases the external validity (generalizability) of study findings. Another source of selection bias is that some studies identified statistically significant differences in baseline demographic characteristics, socioeconomic status, and physical health characteristics compared to a control group, which could affect HCU. There also was significant potential for source bias and information bias because the majority of studies were retrospective, using secondary data analysis when data collection occurred prior to formulating the study aims and design.

There were also limitations to the findings of this integrative review. Although investigators established operational definitions to guide the identification and conceptualization of HCU, HCU outcome measures included in the review are subject to interpretation. Reviewers used a two-person consensus model for inclusion of all MHDs, SUDs, and HCU outcome measures to try to mitigate subjective, individual interpretation. Although study findings suggested that depression was associated with increased HCU and schizophrenia was associated with decreased HCU, the heterogeneity of MHDs and types of cancer limits the ability of reviewers to draw strong conclusions about the relationship between specific MHDs, types of cancer, and HCU until more data are available for review. Additional limitations are the exclusion of non-English studies and the exclusive use of large, online literature search engines.

Implications for Nursing

These findings have significant implications for clinical nursing, as well as future research. Cancer treatment is a multifaceted combination of surgery, radiation, and chemotherapy. Patients with MHDs and SUDs may require additional mental health and cancer screening to ensure they receive adequate assistance navigating the complexities of cancer care. The unique clinical symptomatology of mental health and SUDs can influence HCU. For example, underreporting, denial, symptom minimization, and poor insight are all common phenomena in patients with schizophrenia that may influence mental health and cancer screening (Carney & Jones, 2006).

Oncology nurses are essential to addressing HCU because of their direct patient contact throughout the multiple stages of care, including screening for postoperative complications and adverse drug reactions, patient and family education, discharge planning, and outpatient care transitions (Naylor, Aiken, Kurtzman, Olds, & Hirschman, 2011). Some clinical areas of concern include more intensive monitoring for postoperative complications and adverse drug reactions in patients with MHDs and SUDs. Farasatpour et al. (2013) found that patients who presented with psychotic symptoms were more likely to not only delay or refuse treatment, but also to exhibit disruptive behavior in the hospital setting. These patients with psychotic symptoms were also at greater risk of postoperative surgical complications like deep and superficial wound infection, pneumonia, and mastectomy flap necrosis (Farasatpour et al., 2013). In addition, oncology medications can have significant pharmacodynamic and

pharmacokinetic drug interactions with psychotropic drugs, resulting in negative side effects and noncompliance (Zhou et al., 2010). Finally, oncology nurses are essential to assessing and advocating for patients in chronic pain, as well as monitoring for prescription drug use disorders and other SUDs as the health system in the United States manages a growing opioid crisis (Manchikanti et al., 2012). Greater education regarding the specific needs of patients with MHDs and SUDs throughout oncology nursing is necessary to optimize health outcomes and HCU.

Conclusion

This is one of the first integrative reviews focused on examining the conceptualization and operationalization of HCU in the context of MHDs, SUDs, and cancer. As HCU evolves from volume of health services to a marker of healthcare value and efficiency, standardized HCU measures are needed in research that reflect how HCU is evolving into a measure of healthcare quality. Additional research and clinical initiatives are needed to improve not only effective HCU, but also cancer health outcomes in this unique, high-risk population.

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