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ORIGINAL ARTICLE – HEPATOBILIARY TUMORS

The Impact of Dedicated Cancer Centers on Outcomes Among Medicare Beneficiaries Undergoing Liver and Pancreatic Cancer Surgery

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ABSTRACT

Background. The Alliance of Dedicated Cancer Centers (DCCs) is comprised of 11 institutions that are exempt from the prospective payment system utilized by Medicare for hospital reimbursement.

Objective. The aim of this study was to compare short- and long-term outcomes of patients undergoing liver and pancreatic surgery for cancer at DCCs versus non-DCCs.

Methods. Patients who underwent a liver or pancreatic operation for a malignant indication between 2013 and 2015 were identified using the Medicare Inpatient Standard Analytic Files. Regression analyses and the Kaplan–Meier method were used to assess short- and long-term outcomes of patients at DCCs versus non-DCCs.

Results. Among 13,256 patients, 7.0% of patients were treated at a DCC. Median patient age and complexity of surgical procedures were comparable among DCCs and non-DCCs (all $p > 0.05$). Overall complications (16.5% vs. 23.6%), 90-day readmission (26.2% vs. 30.2%), and 90-day mortality (3.0% vs. 8.7%) were lower at DCCs compared with non-DCCs (all $p < 0.001$). In addition, long-term hazards of death among patients undergoing hepatectomy [hazard ratio (HR) 0.64, 95% confidence interval (CI) 0.54–0.75] and pancreatectomy (HR 0.66, 95% CI 0.56–0.78) were lower among patients treated at DCCs (both $p < 0.05$). While Medicare payments for patients undergoing pancreatic surgery (DCC: $22,200 vs. non-DCC: $22,100; $p = 0.772$) were comparable among DCC and non-DCC hospitals, Medicare payments for liver resection at DCCs were 13.9% lower than non-DCCs (DCC: $16,700 vs. non-DCC: $19,400; $p < 0.001$).

Conclusions. Patients undergoing hepatopancreatic surgery at DCCs had better short- and long-term outcomes for the same/lower level of Medicare expenditure as non-DCC hospitals. DCCs provide higher-value surgical care for patients undergoing liver and pancreatic cancer operations.

In response to the National Cancer Act, the Alliance of Dedicated Cancer Centers (ADCCs) was created in 1971. The ADCC is comprised of 11 dedicated cancer centers (DCCs) that have a unique and sole focus on cancer treatment.[1] DCCs exclusively treat cancer patients and provide multidisciplinary cancer care.[1] Over time, DCCs experienced economic challenges due to the low payments received from the Medicare payment system for cancer care. As a result, Congress defined new rules governing Medicare payments to DCCs, known as the prospective payment system (PPS).[1] Medicare utilizes the PPS to reimburse hospitals for their services and is based on the assumption that low payment treatments are

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counterbalanced by high payments for other diseases and procedures by hospitals.[2] Since this underlying assumption does not hold true for DCCs, Congress made DCCs exempt from the PPS that is typically used by the Centers for Medicare and Medicaid Services (CMS) to pay for inpatient services.[1]

Recent policy changes in Medicare payments have focused on financially rewarding hospitals that provide high-quality care at lower cost—higher-value care—while penalizing hospitals with poor performance.[1,2] This shift in CMS payment policies from a fee-for-service model to a pay-for-performance paradigm has driven a growing interest in understanding hospital-related factors associated with high-value care. Recent research analyzing structural measures have focused mainly on the effects of hospital volume or provider-to-patient ratio, and have identified certain hospital-level characteristics that impact the outcomes of cancer patients. In particular, surgery performed at high-volume hospitals by high-volume surgeons has resulted in lower rates of postoperative morbidity and mortality, as well as a shorter hospital length of stay (LOS).[3–6]

Although this volume/outcomes relationship has been established in the delivery of high-value care, no study has specifically investigated the impact of DCC status on outcomes among patients undergoing surgery for liver and pancreatic cancer. As such, the aim of the current study was to analyze clinical outcomes of patients who underwent liver and pancreatic resection at DCCs versus non-DCCs. In addition, we sought to assess the relationship of Medicare expenditures and overall survival (OS) in DCCs versus non-DCCs among patients undergoing liver and pancreas surgery.

METHODS

Data Sources and Study Population

Patients who underwent liver and pancreas resection between 2013 and 2016 were identified using the Medicare Inpatient and Outpatient Standard Analytic Files (SAFs). The SAFs are maintained by the CMS and include patient-level data on demographic characteristics, diagnoses, procedures, and expenditures. Patients with the corresponding International Classification of Diseases, 9th Revision (ICD-9) procedure codes for minor liver resections [partial hepatectomy (5022)] and major liver resections [hepatic lobectomy (503)], as well as minor pancreatic resections [distal pancreatectomy (5252), other partial pancreatectomy (5259)] and major pancreatic resections [proximal pancreatectomy (5251), radical subtotal pancreatectomy/whipple (5253), total pancreatectomy (526) and radical pancreatoduodenectomy (527)] were included in the study. Patients who underwent emergency or urgent operations and patients with benign disease were excluded from the study.

Patients were categorized based on the type of hospital where they underwent surgery. DCCs were identified and defined as hospitals specializing uniquely in cancer treatment and are exempted from PPS. The remaining hospitals in the Inpatient PPS (IPPS)–SAF were categorized as non-DCCs.[7] The study was approved by the Institutional Review Board at the Ohio State University Wexner Medical Center.

Primary Outcomes and Analytic Variables

The primary outcomes of the study were the incidence of postoperative complications during the index hospitalization, failure-to-rescue rates, 30- and 90-day readmission, and the incidence of 30- and 90-day postoperative mortality. Postoperative complications were determined using all ICD-9, Clinical Modification (ICD-9-CM) diagnostic and procedure codes from the index hospitalization (electronic supplementary Table 1).[8–11] Serious complications were defined as a complication associated with an extended LOS (> 75th percentile for each procedure).[12,13] Failure to rescue was defined as the presence of at least one complication during index hospitalization associated with death within 90 days after surgery.[14] Mortality, defined as patient death within 30 and 90 days from the index operation, was obtained from the SAF denominator file. Hospital volume was determined by calculating the number of hepatic and pancreatic surgeries in each individual year (2013–2015) and was assigned to each individual patient as a continuous variable. All hospitals with above average number of annual procedures were defined as high-volume hospitals.

Medicare Payments

Additional analyses were performed to understand patterns of Medicare payments among DCC and non-DCC hospitals for both the index hospitalization and readmission, if applicable. Payments were risk-adjusted to account for patient-specific factors. In addition, payments were price-standardized by excluding indirect subsidies provided for medical education, disproportionate share costs, and geographic influence.[15–17]

Statistical Analysis

Patient demographics and treatment characteristics were compared among patients undergoing liver or pancreatic surgery at DCCs and non-DCCs. Discrete variables were reported as medians and interquartile ranges (IQRs) and categorical variables were reported as total count and frequencies. Bivariable analyses were performed using the Chi square or Wilcoxon rank test as appropriate.

Multivariable logistic regression was performed to analyze the effect of DCCs on postoperative clinical outcomes, controlling for age, sex, race, prior admissions, surgical approach, LOS, comorbid conditions, hospital volume and teaching status. Prior admissions were defined as any admission to the hospital 1-year before surgery. Furthermore, survival analyses were performed to compare the effect of DCCs versus non-DCCs and various clinical factors on OS using a Cox proportional hazards model. Survival was adjusted for censoring and median values were calculated using the log-rank test. All analyses were conducted using SAS 9.4 (SAS Institute Inc., Cary, NC, USA), and a p value < 0.05 (two-tailed) was considered statistically significant.

RESULTS

Baseline Characteristics

A total of 13,256 patients who underwent a liver or pancreatic resection [hepatic: 41.3% (n = 5470); pancreatic: 58.7% (n = 7786)] and met the inclusion criteria were identified. The overwhelming majority of patients had surgery at a non-DCC (n = 12,324, 93%), while the remaining 7% (n = 932) underwent surgical resection at a DCC (Table 1). Median patient age [DCC: 71 years (IQR 71–77) vs. non-DCC: 72 years (IQR 68–77)], median hospital LOS [DCC: 7 days (IQR 5–11) vs. non-DCC: 7 days (IQR 6–10)] and complexity of surgical procedures [major hepatectomy: 11.2% (n = 104) vs. 9.5% (n = 1167); major pancreatectomy: 35.9% (n = 335) vs. 45.1% (n = 5553); minor hepatectomy: 39.5% (n = 368) vs. 31.1% (n = 3831); minor pancreatectomy: 13.4% (n = 125) vs. 14.4% (n = 1773)] were comparable among DCCs and non-DCCs. In contrast, patients treated at DCCs had higher Charlson comorbidity scores [CS $\geq$ 5: DCC 70.8% (n = 660) vs. non-DCC 52.4% (n = 6463); $p < 0.001$] and were more likely to undergo surgery using a minimally invasive approach versus non-DCCs [18.4% (n = 171) vs. 10% (n = 1233); $p < 0.001$].

Perioperative Outcomes

DCC hospitals had a lower incidence of overall complications [16.5% (n = 154) vs. 23.6% (n = 2910)], serious complications [11.2% (n = 114) vs. 12.4% (n = 1532)] and failure to rescue [9.3% (n = 10) vs. 19.1% (n = 336)] compared with non-DCCs (all $p < 0.001$). In addition, rates of 90-day readmission [DCC: 26.2% (n = 244) vs. non-DCC: 30.2% (n = 3720)], 30-day mortality [DCC: 2.1% (n = 20) vs. non-DCC: 5% (n = 618)], and 90-day mortality [DCC: 3% (n = 28) vs. non-DCC: 8.7% (n = 1067)] were lower at DCCs compared with non-DCCs (all $p < 0.001$); however, 30-day readmission rates were similar among DCCs versus non-DCCs [18.7% (n = 174) vs. 19.6% (n = 2410); p = 0.51]. Furthermore, patients treated at DCCs were more likely to be discharged home [DCC: 62.9% (n = 586) vs. non-DCC 47.4% (n = 5836); $p < 0.001$] (Table 1).

Among patients undergoing pancreatic surgery, the odds of developing a postoperative complication at DCCs were 38% lower compared with surgery at a non-DCC [odds ratio (OR) 0.62, 95% confidence interval (CI) 0.45–0.87, p = 0.005] (Table 2). Similarly, patients treated at a DCC were 74% less likely to die following a complication in the hospital (failure to rescue: OR 0.26, 95% CI 0.09–0.87, p = 0.029) and 61% less likely to die within 90 days (90-day mortality: OR 0.39, 95% CI 0.23–0.66, $p < 0.001$) versus patients treated at a non-DCC. However, the incidence of serious complications was comparable for patients with pancreatic cancer treated at DCCs and non-DCCs (OR 1.24, 95% CI 0.79–1.97, p = 0.352). Similarly, patients undergoing liver surgery at DCCs had 60% and 74% lower odds of dying at 30- and 90-days following surgery compared with non-DCCs, respectively (30-day mortality: OR 0.40, 95% CI 0.16–0.98, p = 0.046; 90-day mortality: OR 0.26, 95% CI 0.13–0.50, $p \leq 0.001$) (Table 3). Moreover, patients treated at DCCs had 76% lower rates of death after complication (OR 0.24, 95% CI 0.08–0.73, p = 0.012).

Medicare Payments

Medicare payments for patients undergoing surgery at DCCs were different from payments for patients undergoing surgery at non-DCCs. Specifically, price-standardized median Medicare payments for the index hospitalization among patients who underwent liver or pancreatic surgery at DCCs totaled $20,000, versus $20,700 among individuals undergoing surgery at non-DCC hospitals ($p < 0.001$). After stratifying payments by procedure type, Medicare payments for the index hospitalization among patients undergoing liver resection at DCCs were 13.9% lower than non-DCCs (DCC: $16,700 vs. non-DCC: $19,400; $p < 0.001$) (Fig. 1). However, Medicare payments for the index hospitalization for patients undergoing pancreatic surgery were comparable among DCC and non-DCC hospitals (DCC: $22,200 vs. non-DCC: $22,100; p = 0.772).

Long-Term Survival

Several patient and hospital factors were associated with an increased risk of death following pancreatic surgery: older age [hazard ratio (HR) 1.03, 95% CI 1.02–1.04, $p < 0.001$], male sex (HR 1.07, 95% CI 1.01–1.13,

TABLE 1 Patient and hospital characteristics, clinical factors, and outcomes for pancreas and liver operations

Patient characteristics	Total	Non-DCC	DCC	*p* value
No. of patients (%)	13,256 (100)	12,324 (93.0)	932 (7.0)	
Age, years [median (IQR)]	72 (68–77)	72 (68–77)	71 (71–77)	0.001
Sex				0.070
Male	7058 (53.2)	6588 (53.5)	470 (50.4)	
Female	6198 (46.8)	5736 (46.5)	462 (49.6)	
Race				0.042
White	11,866 (89.5)	11,022 (89.4)	844 (90.6)	
Black	755 (5.7)	718 (5.8)	37 (4)	
Other/unknown	635 (4.8)	584 (4.7)	51 (5.5)	
Prior admissions				0.063
0 stay	6967 (52.6)	6447 (52.3)	520 (55.8)	
1 stay	3981 (30.0)	3709 (30.1)	272 (29.2)	
2 + stays	2308 (17.4)	2168 (17.6)	140 (15.0)	
Charlson score				< 0.001
0	267 (2.0)	249 (2.0)	18 (1.9)	
1	87 (0.7)	82 (0.7)	5 (0.5)	
2	3575 (27)	3420 (27.8)	155 (16.3)	
3	1151 (8.7)	1109 (9)	42 (4.5)	
4	1053 (7.9)	1001 (8.1)	52 (5.6)	
5 ≤	7123 (53.7)	6463 (52.4)	660 (70.8)	
Liver resection				0.518
Minor	4199 (31.7)	3831 (31.1)	368 (39.5)	
Major	1271 (9.6)	1167 (9.5)	104 (11.2)	
Pancreatic resection				0.149
Minor	1898 (14.3)	1773 (14.4)	125 (13.4)	
Major	5888 (44.4)	5553 (45.1)	335 (35.9)	
Surgical approach				< 0.0001
Open	11,852 (89.4)	11,091 (90)	761 (81.7)	
MIS	1404 (10.6)	1233 (10)	171 (18.4)	
Length of stay, days [mean (SD)]	7 (5–11)	7 (5–11)	7 (6–10)	0.206
Any complication	3064 (23.11)	2910 (23.6)	154 (16.5)	< 0.001
Serious complication	1619 (12.2)	1532 (12.4)	114 (11.2)	< 0.001
Failure to rescue	346 (18.5)	336 (19.1)	10 (9.3)	0.010
30-Day readmission	2584 (19.5)	2410 (19.6)	174 (18.7)	0.510
90-Day readmission	3964 (29.9)	3720 (30.2)	244 (26.2)	0.010
30-Day mortality	638 (4.8)	618 (5)	20 (2.1)	< 0.001
90-Day mortality	1095 (8.3)	1067 (8.7)	28 (3)	< 0.001
Discharge disposition				< 0.001
Home	6422 (48.4)	5836 (47.4)	586 (62.9)	
SNF/other	3923 (29.6)	3668 (29.8)	255 (27.4)	
Home healthcare	1095 (8.3)	1067 (8.7)	28 (3.0)	

Data are expressed as *n* (%) unless otherwise specified

MIS minimally invasive surgery, *SNF* skilled nursing facility, *DCC* dedicated cancer center, *IQR* interquartile range, *SD* standard deviation

$p = 0.028$), a higher comorbidity burden (Charlson comorbidity score 3–4: HR 1.28, 95% CI 1.17–1.40, $p < 0.001$; Charlson comorbidity score ≥ 5: HR 1.64, 95% CI 1.53–1.76, $p < 0.001$) and increased hospital LOS (HR 1.02, 95% CI 1.01–1.03, $p < 0.001$). In contrast, high-volume hospitals (HR 0.85, 95% CI 0.80–0.91, $p < 0.001$) and academic centers (HR 0.88, 95% CI 0.81–0.91, $p < 0.001$) were associated with decreased hazards of

TABLE 2 Clinical outcomes for hospitals stratified by ADCC status for patients undergoing pancreatic surgery (DCC vs. non-DCC)

Variable	Pancreas procedure			
	OR[a]	Lower CI	Upper CI	*p* value
Overall complications	0.62	0.45	0.87	0.005
Serious complications	1.24	0.79	1.97	0.352
Failure to rescue	0.26	0.09	0.87	0.029
30-Day readmission	0.95	0.73	1.24	0.694
90-Day readmission	0.80	0.63	1.02	0.068
30-Day mortality	0.70	0.38	1.28	0.242
90-Day mortality	0.39	0.23	0.66	< 0.001

OR odds ratio, *CI* confidence interval, *ADCC* Alliance of Dedicated Cancer Centers, *DCC* dedicated cancer center

[a]Adjusted for age, sex, race, Charlson score, prior admission, length of stay, surgical approach, hospital volume, and teaching status of the hospital

TABLE 3 Clinical outcomes for hospitals stratified by DCC status for patients undergoing hepatic surgery (DCC vs. non-DCC)

Variable	Liver procedure			
	OR[a]	Lower CI	Upper CI	*p* value
Overall complications	0.83	0.58	1.20	0.321
Serious complications	0.92	0.43	1.98	0.837
Failure to rescue	0.24	0.08	0.73	0.012
30-Day readmission	0.86	0.61	1.20	0.367
90-Day readmission	0.75	0.57	0.99	0.045
30-Day mortality	0.40	0.16	0.98	0.046
90-Day mortality	0.26	0.13	0.50	< 0.001

OR odds ratio, *CI* confidence interval, *DCC* dedicated cancer center

[a]Adjusted for age, sex, race, Charlson score, prior admission, length of stay, surgical approach, hospital volume, and teaching status of the hospital

death. After controlling for all measurable confounding factors on multivariable regression analysis, receipt of pancreatic surgery at a DCC was associated with better OS compared with surgery at a non-DCC (HR 0.66, 95% CI 0.56–0.78, $p < 0.001$) (electronic supplementary Table 2; Fig. 2a). Similarly, factors associated with worse OS following liver surgery included older age (HR 1.03, 95% CI 1.02–1.04, $p < 0.001$), a higher comorbidity burden (Charlson comorbidity score ≥ 5: HR 1.52, 95% CI 1.34–1.72, $p < 0.001$), and prolonged LOS (HR 1.04, 95% CI 1.03–1.04, $p < 0.001$). In contrast, high-volume centers (HR 0.85, 95% CI 0.80–0.91, $p < 0.001$) and teaching status (HR 0.80, 95% CI 0.80–0.89, $p < 0.001$) predicted favorable outcomes following liver resection (electronic supplementary Table 3; Fig. 2b). Of note, patients receiving liver surgery at DCCs had improved OS versus patients treated at non-DCCs (HR 0.64, 95% CI 0.54–0.75, $p < 0.001$) (electronic supplementary Table 3).

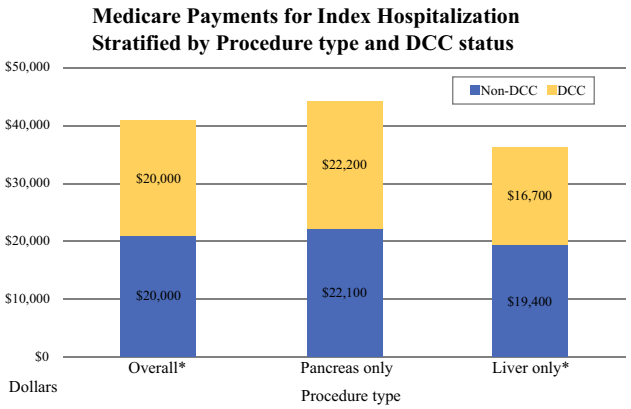

FIG. 1 Medicare payments for index hospitalization for all procedures at DCC versus non-DCC hospitals. *$p < 0.05$. *DCC* dedicated cancer center

DISCUSSION

Designated cancer centers (DCCs) are specialized centers that have a unique focus on cancer treatment and relevant research activities, with the ultimate aim to provide patients with high-quality cancer treatment. Previous research has focused on the impact of DCCs relative to the survival of patients undergoing surgery for lung, breast, and ovarian cancers.[18–20] Even though DCC hospitals provide high-value care for patients with cancer, there are only a few such centers in the US. With an increasing trend in centralization of care and increasing incidence of liver and pancreatic cancers, it is important to understand how clinical outcomes of patients with these cancers differ when treated at DCCs and non-DCCs.[16] Apart from clinical outcomes, it is also important to assess whether these centers represent an increased burden versus value to Medicare relative to the PPS exemption.[2] The current study is important because it demonstrated that patients undergoing liver and pancreatic surgery at DCCs had a lower incidence of overall complications, serious complications, and 90-day readmissions. Equally as important, failure-to-rescue rates were lower at DCCs, which translated to lower rates of 30- and 90-day mortality following liver and pancreatic operations. Furthermore, while overall Medicare payments were comparable between DCCs and non-DCCs, Medicare payments for patients undergoing liver resection at DCCs were lower compared with non-DCCs. These data support the notion that DCC hospitals provide higher quality care at comparable/lower costs, i.e. high-value care.

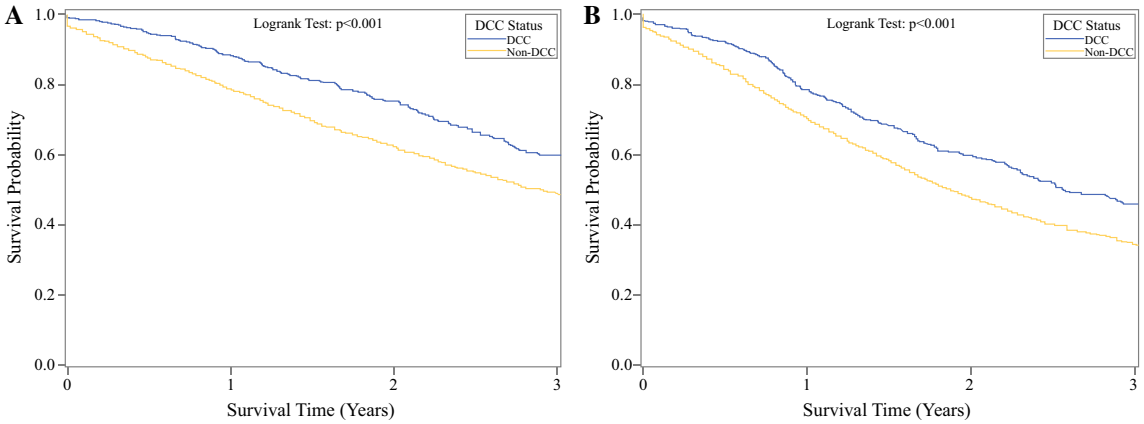

FIG. 2 Overall survival of patients undergoing **a** liver surgery and **b** pancreatic surgery, at DCC versus non-DCC hospitals. *DCC* dedicated cancer center

Recent changes in Medicare payment policies, such as accountable care organizations, bundle payments, and value-based purchasing, have focused on rewarding cost-effective hospitals that provide high-quality care.[21] With the implementation of these new policies, there is an increased interest in understanding factors associated with variations in the quality of surgical care. In the current study, DCC status was an important factor influencing outcomes of patients undergoing liver and pancreatic surgery. Specifically, although 71% of patients treated at DCCs had a Charlson score ≥ 5, complication rates were lower at DCCs (16.5% vs. 23.6%) compared with non-DCCs. Perhaps more importantly, failure-to-rescue rates were 10% higher at non-DCCs compared with DCCs. Failure-to-rescue rates have been increasingly recognized as an important quality metric for hospitals. Specifically, while complications may be due to patient- or procedure-related factors, failure to rescue may be more closely related to system-wide hospital factors.[14] In effect, the early recognition of complications and prompt intervention likely prevents mortality among patients who experience a complication.[22] As such, data from the current study support the beneficial impact of DCC designation among patients undergoing surgery at these centers, with lower rates of morbidity, mortality, and failure to rescue compared with non-DCCs.

Several previous studies have established a variety of patient- and surgeon-level factors associated with morbidity and mortality following complex surgery for cancer. Surgeon volume, for instance, has been repeatedly reported as a factor associated with outcomes following liver and pancreatic surgery.[23–26] Surgical approach has also been linked to outcomes as patients undergoing a minimally invasive approach have been demonstrated to have lower rates of morbidity and mortality following liver and pancreas surgery.[27–30] Specifically, Ejaz et al. reported that a minimally invasive approach was associated with decreased rates of mortality and morbidity compared with a conventional open approach for liver and pancreatic surgery.[27] In addition to surgical factors, there has been an increasing body of evidence that hospital-related factors are closely linked with mortality.[23] Imamura et al. reported a 0% operative mortality and 5.6% major morbidity following 1056 hepatic surgeries performed over 8 years at a cohort of high-volume medical centers.[31] Similar to these findings, we noted that 30- and 90-day mortality at DCCs was lower compared with non-DCCs (30-day: DCC 2.1%, non-DCC 5%; 90-day: DCC 3%, non-DCC 8.7%; both $p < 0.001$). Apart from improved short-term outcomes, data from the current study revealed an improvement in long-term outcomes among patients treated at DCCs versus non-DCCs (HR 0.68, 95% CI 0.60–0.78, $p < 0.001$). Taken together, the data support that patients undergoing liver or pancreas surgery at DCCs have superior short- and long-term outcomes versus patients treated at non-DCCs.

In addition to differences in morbidity and mortality, several other clinical and non-clinical differences were noted between DCCs and non-DCCs. For example, patients undergoing liver or pancreas surgery at DCCs were more likely to be discharged home (62.9% vs. 47.4%) rather than to a facility (27.4% vs. 29.8%) or a home health care setting (3.0% vs. 8.7%) versus patients treated at non-DCCs (all $p < 0.001$). These findings are particularly relevant given that non-home discharge potentially increases the cost and resource burden on the healthcare system. Moreover, discharge to a facility has a negative impact on the quality of life of patients with cancer.[32] With regard to the value of care at DCCs, price-standardized median Medicare payments for patients undergoing liver resections at DCCs were 13.9% lower on average compared with non-DCCs [DCC: $16,700 (IQR $13,000–$23,100) vs. non-DCC: $19,400 (IQR $15,700–$26,800); $p < 0.001$].

Collectively, DCCs were able to provide higher-quality care at the same or lower costs—a key goal in Medicare's initiative of providing high-value surgical care.

There are several limitations that should be considered when analyzing the results of the current study, most related to the use of administrative data. Hospitals were categorized based on the exemption from PPS, yet data on other hospital attributes, such as academic status and urban location, were not considered. Moreover, the study only included patients insured by Medicare; therefore, the results may not be generalizable to a patient population younger than 65 years of age and individuals with other types of insurance. Furthermore, the SAF did not contain some types of clinical data, such as disease stage, histologic subtype, estimated operative blood loss, reoperative status and surgical margins, among others. As such, despite attempts to adjust for patient-and hospital-related factors, unmeasured differences in the baseline characteristics of patients treated at DCC versus non-DCC hospitals may have influenced the results.

CONCLUSIONS

Patients undergoing liver or pancreas surgery at DCCs had improved short- and long-term outcomes compared with patients treated at non-DCCs. DCC status provides higher-value surgical care for patients undergoing liver and pancreas cancer operations versus non-DCCs. As such, the data support DCCs as a high-quality, high-value proposition for the treatment of patients with liver and pancreas cancer.

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