Peer Review File

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Reviewer A

This is an excellent paper looking at 8,401 patients collected from the Nationwide Readmission Database (2010–2014). It is well-written and interesting.

Reply: Thank you for the time dedicated to review our manuscript.

My only concern is that the authors did not give the reader any suggestions on how to reduce the risk of post-operative complications in diabetics after pancreatic surgery.

Comment 1: Do they recommend tighter glycemic control post-operatively possibly with insulin drips?

Shi HJ, Jin C, Fu DL. Impact of postoperative glycemic control and nutritional status on clinical outcomes after total pancreatectomy. World J Gastroenterol. 2017;23(2):265-274. doi:10.3748/wjg.v23.i2.265

Hanazaki K, Yatabe T, Kobayashi M, Tsukamoto Y, Kinoshita Y, Munekage M, Kitagawa H. Perioperative glycemic control using an artificial endocrine pancreas in patients undergoing total pancreatectomy: tight glycemic control may be justified in order to avoid brittle diabetes. Biomed Mater Eng. 2013;23(1-2):109-16. doi: 10.3233/BME-120736. PMID: 23442241.

Reply 1: Thanks for the suggestion. This was a good point to add. We provided this suggestion in the discussion section. Please see Page 10 in Discussion section, Lines 133-137.

"*Therefore, tighter glycemic control post-operatively possibly with insulin drips might mitigate these expected complications and extra expenditure. Considering the complex postoperative medical management, improvement in glycemic control and nutritional status after pancreatectomy further reduced pancreatic exocrine and endocrine insufficiency, and were associated with better survival, and prevented early complications and tumor recurrence*."

Comment 2: Is ICU admission recommended?

Udhayachandhar R, Otokwala J, Korula PJ, Rymbai M, Chandy TT, Joseph P. Perioperative factors impacting intensive care outcomes following Whipple procedure: A retrospective study. Indian J Anaesth. 2020;64(3):216-221. doi:10.4103/ija.IJA_727_19

Reply 2: We totally agree with the reviewer comments. Addressing management plan before and after pancreatectomy is the key to have an integrated picture on reasons of readmission and factors associated with the occurrence of complications. However, in the National Readmission Database (NRD), we could not evaluate differential outcomes in ICU patients compared to General ward admitted patients. Thank you for pinpointing this point, so we mentioned this limitation at the end of the discussion section. Please see Page 10 Line 143.

Comment 3: Is there any benefit to getting an endocrine work-up pre-operatively or in the immediate post-operative period?

Hamilton L, Jeyarajah DR. Hemoglobin A1c can be helpful in predicting progression to diabetes after Whipple procedure. HPB (Oxford). 2007;9(1):26-28. doi:10.1080/13651820600917286

Reply 3: This is another remarkable point. However, we have limitation in the NRD database, and actually, in many other national databases we worked on in our research team. Detailed work-up, lab testing results, pathological data, detailed management are not available. We are aware of their remarkable importance, but unfortunately, we can't cover this point to investigate the importance of HbA1c.

Comment 4: What about total pancreatectomy, should it be considered in certain patients to reduce the risk of pancreatic fistula? Perhaps in diabetic patients with small pancreatic ducts and a soft pancreas?

Salvia R, Lionetto G, Perri G, Malleo G, Marchegiani G. Total pancreatectomy and pancreatic fistula: friend or foe?. Updates Surg. 2021;73(4):1231-1236. doi:10.1007/s13304-021-01130-3

Reply 4: ICD9 codes available specify the type of surgery. When we applied multivariate regression analysis to identify risk factors for post-operative complications and readmission rates. Different surgical procedures did not have impact on complications; however, patients underwent total pancreatectomy were more likely to be readmitted after discharge, please see Table 3.

Variables	**Type of surgical procedure**	**aOR**	**95%CI**	***p*-value**
Post-operative complications	Partial pancreatectomy / excision	*Reference*		
	Total pancreatectomy	1.56	0.98, 2.48	0.05
	Radical pancreaticoduodenectomy	1.10	0.90, 1.33	0.35
Readmission	Partial pancreatectomy / excision	*Reference*		
	Total pancreatectomy	2.24	1.50, 3.35	**<0.001**
	Radical pancreaticoduodenectomy	1.15	0.95, 1.39	0.16

aOR: adjusted odds ratio.

Reviewer B

The authors report the clinical impact of the presence of DM for the outcome after pancreatectomies. The report is interesting and important for both the pancreatic surgeons and physicians. But I have some comments for the authors. The major drawback of this report was the unclear definition of the presence of DM and controllability of DM. Are these data the subjective data of the data entry person of each hospital? Furthermore, the definition of the postoperative complications, which is one of the most important outcomes, is unclear. Was it not Clavien-Dindo classification grade 3 or more?

Reply: We greatly appreciate reviewer effort and time to review our manuscript. NRD database provide coded variables (ready existed) for the points mentioned above. Details on patients' diagnosis and comorbidities in the study years are ICD9 coded. Being controlled or uncontrolled, type of diabetes, complicated or uncomplicated diabetes were coded in the database as shown in the Supplementary Table below. Unfortunately, identifying more details from the database is not feasible. Data for each hospital is concealed for deidentification of patients. Patients were meticulously diagnosed in their corresponding hospitals and coders define the code which specify the type of diabetes, whether controlled or not, complicated or uncomplicated based on their personal physicians/surgeons. Please see Supplementary Materials below for more information

Supplementary Table S1. ICD-9-CM Diagnosis and Procedure Codes for study variables

Variables	Codes
Main study variables	
Obesity	278, 2780, 27800 – 27803
Body mass index	V85, V850, V851, V852 V8521 - V8525, V853 V8530 - V8539, V854 V8540 - V8545
Metabolic syndrome	2777, 41400-41407, 27800-27803
Diabetes	250 Diabetes mellitus 250ϕ DM, Uncomplicated 2501 – 2509 DM, Complicated
Type I: (controlled, uncontrolled)	25001, 25003, 25011, 25013, 25021, 25023, 25031, 25033, 25041, 25043, 25051, 25053, 25061, 25063, 25071, 25073, 25081, 25083, 25091, 25093
Type II or unspecified (controlled, uncontrolled)	25000, 25002, 25010, 25012, 25020, 25022, 25030, 25032, 25040, 25042, 25050, 25052, 25060, 25062, 25070, 25072, 25080, 25082, 25090, 25092
Controlled vs Uncontrolled	24900, 24901, 24910, 24912, 24920, 24922, 24930, 24932, 24940, 24942, 24950, 24952, 24960, 24962, 24970, 24972, 24980, 24982, 24990, 24992
Diagnosis	
Functional disorder	2515,2518, 2519, 5770, 5771, 5772, 5778, 5779
Benign disease	2116
Malignant disease	1570, 1571, 1572, 1573, 1578, 1579
Procedures	
Partial pancreatectomy	5200, 5209, 525, 5251, 5253, 5259, 522, 5221, 5222
Total pancreatectomy	526
Radical pancreaticoduodenectomy	527
Complications	
Bleeding/shock	2851, 9981, 99811, 99812, 99813, 9982, E8700, 3998, 9904, 5412, 5419
Infection/sepsis	0380, 0389, 78552, 6822, 9983, 99831, 99832, 9985, 99851, 99859, 99883, 8604, 543, 5491
Technical complications	9982, 9984, 9986, 9987, 55321, 5778, 4143, 415, 4195, 5061, 5069, 3932
Cardiovascular complications	41000, 41001, 41002, 41010, 41050, 41051, 41052, 41060, 41061, 41062, 41070, 41071, 41072, 41080, 41081, 41082, , 41090, 41091, 41092, 41511, 99701, 99702, 9972, 99779, 78559, 4010, 40509, 4275, 99791, 9980
Renal complications	584, 5845, 5846, 5847, 5848, 5849, 5856, 586
Pulmonary complications	518, 5181, 5184, 5187, 5188, 5185, 51881, 51882, 9973, 9672
Endocrine complications	2513, 2554, 2521, 27541, 2440, 2554
Wound complications	9983, 99883

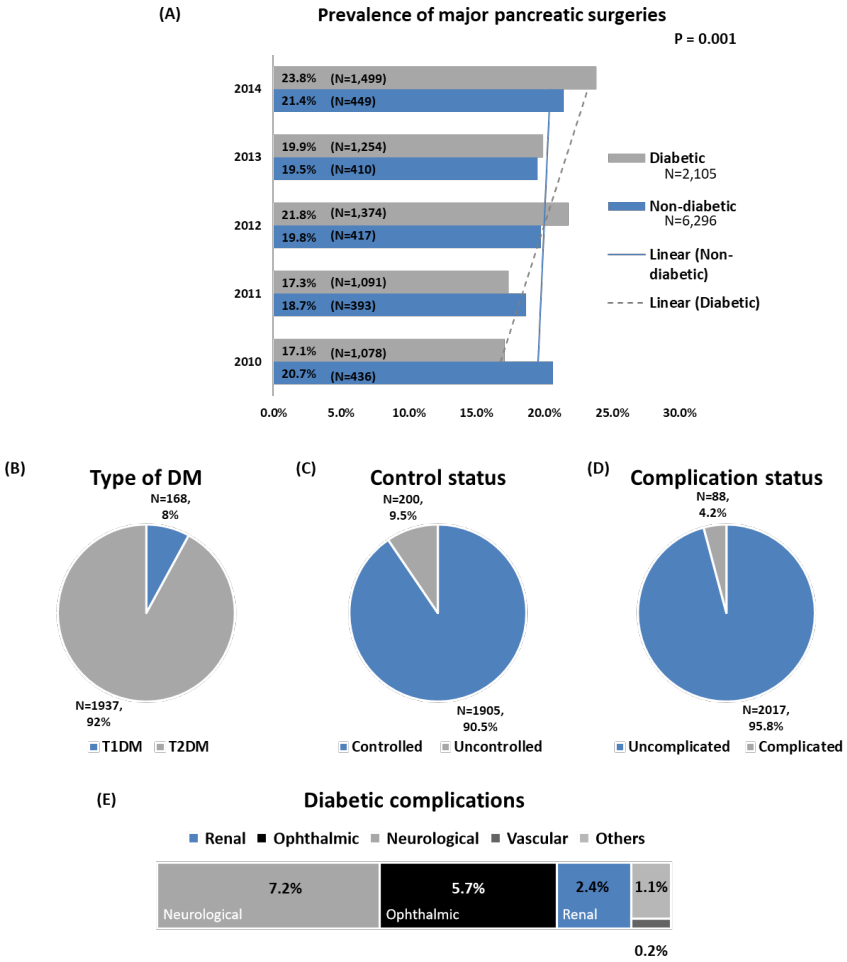
The other minor comments are listed below.

Comment 1: Please unify the description, inpatient mortality (line 31 etc…) or in-hospital mortality (line 36 etc…).

Reply 1: Thank you for the remark, we unified the term to be '*in-hospital mortality*' across different location in the manuscript.

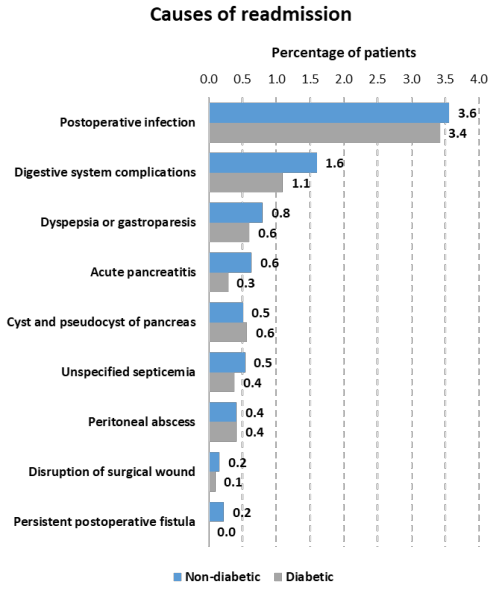
Comment 2: Please describe the patient numbers in addition to the percentages in figure 2.

Reply 2: Thank you for your suggestion, number of patients was added to the figure.



Comment 3: Causes of readmission are also important data to be presented.

Reply 3: A new figure was added to describe the frequency of each cause in diabetic and non-diabetic cohorts. There was no significant difference in cause of readmission (Fig.5) as well as the rate of readmission (Table 2) between diabetic and non-diabetics.



Comment 4: I think the figure 5 is not necessary for this report.

Reply 4: The data is not significant, so the figure did not add much information. Therefore, authors removed the figure and reorder the downstream figure.

Comment 5: The patient number of each non-diabetic and diabetic are recommended to be presented in figure 6 and table 2.

Reply 5: Done as suggested, numbers are added in figure 6 and table 2. For clarification: please see the figure below.

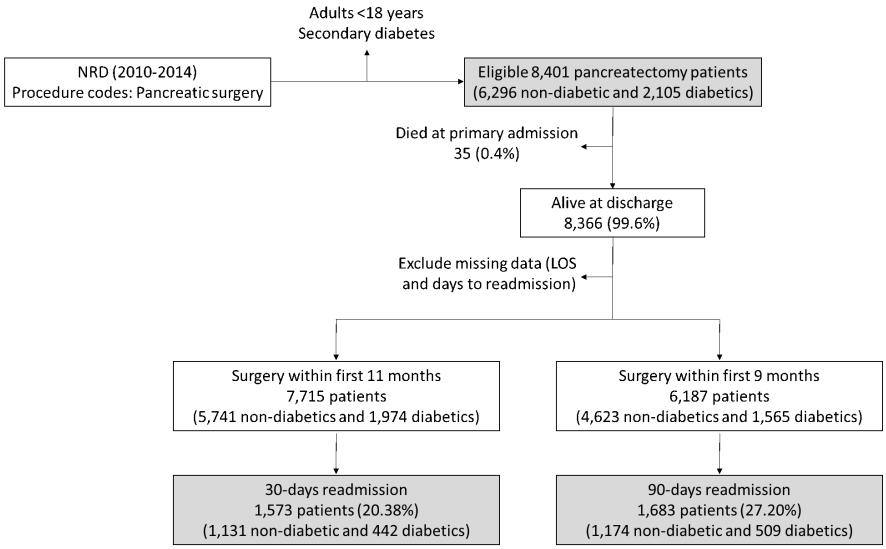
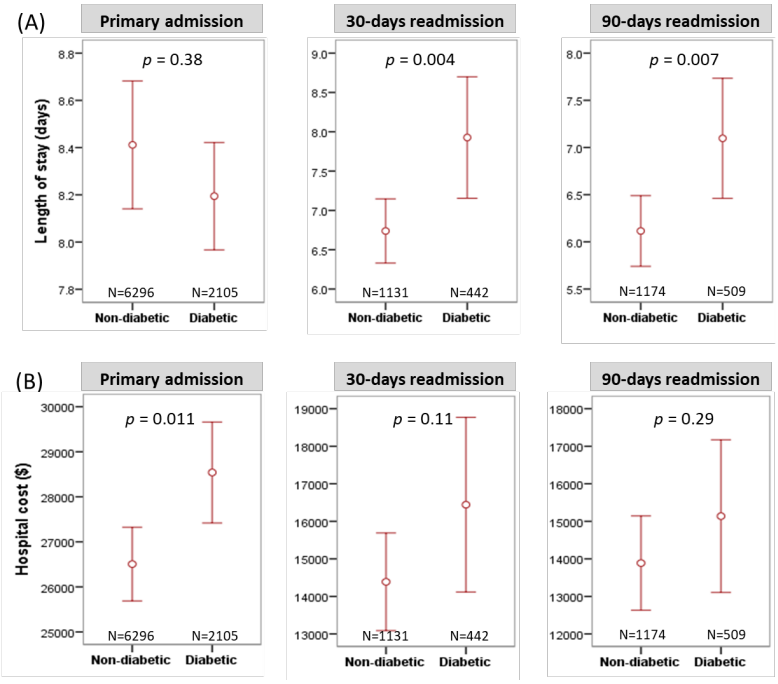


Table 2. Stratification analysis of diabetic patients according to their diabetic status.

Characteristics	Levels	Type of diabetes			Diabetic control			Diabetic complications		
		T1DM (N=168)	T2DM (N=1937)	P value	Controlled (N=1905)	Uncontrolled (N=200)	P value	Uncomplicated (N=2017)	Complicated (N=88)	P value
Age (year)	Mean ± SD	46.73 ± 13.39	61.95 ± 12.45	**<0.001**	60.08 ± 13.59	61.32 ± 12.05	0.20	58.96 ± 14.09	54.16 ± 15.37	**<0.001**
Gender	Male	101 (60.5)	1030 (53.1)	**0.040**	1027 (53.9)	99 (49.3)	0.21	1080 (53.6)	51 (57.5)	0.41
	Female	67 (39.5)	907 (46.9)		873 (46.1)	101 (50.7)		937 (46.4)	37 (42.5)	
CCI score	0	77 (45.8)	1428 (73.7)	**<0.001**	1372 (72.5)	132 (68.9)	0.41	1404 (69.6)	51 (57.4)	**0.015**



Reviewer C

It is a cross-sectional analysis of the National Readmission Database to evaluate the association between preclinical diabetes and postoperative outcomes after pancreatic surgery. The interesting point of this study is that the postoperative hospital stay is almost the same at eight days, although there is a statistical difference. In addition, length of stay and the readmission risk is rarely increased by preoperative diabetes. Moreover, postoperative complications are associated with bleeding and renal complications, but not infection/sepsis. However, it is disappointing that the aim of the study is ambiguous; it is uncertain whether the authors examine the associations among patients with/without preoperative diabetes or among patients with preoperative diabetes.

Reply: Thank you for reviewing the manuscript. The aim of the study was to compare the outcomes between diabetic and non-diabetic cohorts. We agree it was ambiguous in the introduction (rationale statement). We modified the end of introduction (See Page 3, line 62) and study outcomes section in methodology (See Page 5, lines 100-101).

I have several questions and comments to be addressed as follows.

Comment 1: In the abstract, what should be described in the result is described in the conclusion.

Reply 1: Thank you for the note, we added more data in the results section of abstract to fit the conclusion (See page 2, lines 36-38).

Comment 2: It is better to describe the definition of controlled diabetes and uncontrolled diabetes and the definition of cooperative diabetic complications.

Reply 2: Being controlled or uncontrolled, type of diabetes, complicated or uncomplicated diabetes were coded in the dataset (please See the supplementary Table). They were predefined from the hospital records.

Comment 3: Is the difference in costs during primary admission due to the costs directly related to diabetes treatment? Is it related to the treatment of complications?

Reply 3: Yes, we believe so. Based on data in Table 2, uncontrolled and complicated cases incurred higher hospital costs. Please See page 9, lines 326-331 in discussion.

Table 2. Stratification analysis of diabetic patients according to their diabetic status.

Characteristics	Levels	Type of diabetes			Diabetic control			Diabetic complications		
		T1DM (N=168)	T2DM (N=1937)	P value	Controlled (N=1905)	Uncontrolled (N=200)	P value	Uncomplicated (N=2017)	Complicated (N=88)	P value
Age (year)	Mean ± SD	46.73 ± 13.39	61.95 ± 12.45	**<0.001**	60.08 ± 13.59	61.32 ± 12.05	0.20	58.96 ± 14.09	54.16 ± 15.37	**<0.001**
Gender	Male	101 (60.5)	1030 (53.1)	**0.040**	1027 (53.9)	99 (49.3)	0.21	1080 (53.6)	51 (57.5)	0.41
	Female	67 (39.5)	907 (46.9)		873 (46.1)	101 (50.7)		937 (46.4)	37 (42.5)	
CCI score	0	77 (45.8)	1428 (73.7)	**<0.001**	1372 (72.5)	132 (68.9)	0.41	1404 (69.6)	51 (57.4)	**0.015**
	1	10 (6)	373 (19.2)		341 (17.9)	41 (20.3)		325 (16.1)	15 (17.5)	
	≥2	81 (48.2)	136 (7)		189 (9.6)	22 (10.8)		288 (14.3)	22 (25.1)	
Postoperative complications	None	59 (35.1)	1347 (69.5)	**<0.001**	1309 (68.7)	97 (48.5)	**<0.001**	1367 (71.2)	40 (50.6)	**<0.001**
	One or more	109 (64.9)	590 (30.5)		596 (31.3)	103 (51.5)		650 (28.8)	48 (49.4)	
Length of stay, days	Mean ± SD	7.96 ± 3.36	8.14 ± 5.07	0.64	8.03 ± 4.96	9.17 ± 4.28	**0.001**	8.56 ± 10.25	8.10 ± 4.08	0.39
Hospital costs, $	Mean ± SD	62,592.76 ± 36,238.50	25,511.12 ± 20,248.92	**<0.001**	28,182.21 ± 24,070.27	34,171.04 ± 20,846.61	**0.001**	26,530.02 ± 28,834.56	47,177.01 ± 35,085.96	**<0.001**

Data is shown as number (percentage) or mean ± standard deviation (SD). All numbers are presented as weighted national estimates. Two-sided Chi-square and

Comment 4: Is the difference of bleeding in the gastrointestinal tract or outside the gastrointestinal tract in the complications?

Reply 4: Thank you for your note. Bleeding complication included systemic events

during the surgical operation or after, outside the gastrointestinal tract, and not include postoperative hematemesis or melena. Interpretation of Supplementary Table codes for bleeding is illustrated below:

2851	Acute posthemorrhagic anemia
9981	Hemorrhage or hematoma complicating a procedure not elsewhere classified
99811	Hemorrhage complicating a procedure
99812	Hematoma complicating a procedure
99813	Seroma complicating a procedure
9982	Accidental puncture or laceration during a procedure, not elsewhere classified
E8700	Accidental cut, puncture, perforation or hemorrhage during surgical operation
3998	Control of hemorrhage, not otherwise specified
9904	Packed cell transfusion (Transfusion of packed cells)

Comment 5: Some figures can be deleted to simplify this article.
Reply 5: Upon request to remove figures, we removed Figure 5 and shifted the order of downstream figure.

Comment 6: The results in Table 2 are interesting. I think that the authors should focus on them to set up protective therapeutic strategies in the future.
Reply 6: Thank you for the remark. We followed reviewer suggestion and added a paragraph in the end of discussion before limitation, please see Page 10 (highlighted). Also, we wanted to pinpoint the limitation of the absence od detailed management and ICU admission that could have been used to integrate in the regression model.

Comment 7: I don't understand the significance of Table 3 in this study.
Reply 7: Descriptive Tables 1 and 2 showed there is significant difference in the characteristics of the two comparative groups (diabetic vs. non-diabetic). To address if these risk factors are independently associated with the outcome (postoperative complications or readmission) that can act as predictors, we performed multivariate regression analysis which explain how factors in variables respond simultaneously to changes in others. If the odds ratio and confidence interval are below one as below, this means high annual income (Q3 and Q4) was associated with 27% to 30% reduced risk of postoperative complications.

Median annual household income	Quartile 1 lowest	*Reference*			
	Quartile 2	0.94	0.76, 1.15	0.52	
	Quartile 3	0.77	0.63, 0.94	**0.012**	
	Quartile 4 highest	0.70	0.58, 0.86	**0.001**	
Type of surgical	Partial	*Reference*			

In contrast, if the odds ratio and confidence interval are above one, this indicates that this factor increased the risk of the outcome.

		complications		**value**
		aOR	**95%CI**	
Age (year)	>18-45	*Reference*		
	>45-65	1.27	1.02, 1.60	**0.035**
	>65	1.27	1.00, 1.62	**0.049**

Comment 8: After all, do the authors think preoperative diabetes is not a clinical problem in pancreatic surgery? Do they think it is a problem that should be considered a lot?

Reply 8: Thank you for raising this important note, we added a paragraph in the discussion (Page 10). According to our analysis in the NRD database on over 8 thousand patients underwent pancreatic surgery. Diabetes comorbidity increased the risk of postoperative complications. Therefore, tighter glycemic control post-operatively possibly with insulin drips might mitigate these expected complications and extra expenditure. Considering the complex postoperative medical management, improvement in glycemic control and nutritional status after pancreatectomy further reduced pancreatic exocrine and endocrine insufficiency. They were associated with better survival and prevented early complications and tumor recurrence (PMID: 28127200 and 23442241).

Patients will also benefit from getting an endocrine work-up pre-operatively or in the immediate post-operative period (PMID: 18333109). Also, Intensive Care Unit admission might be recommended. The APACHE II score during ICU admission and the presence of pulmonary complications requiring invasive ventilation were found to be independent predictors of adverse outcomes (PMID: 32346169).

References

Shi HJ, Jin C, Fu DL. Impact of postoperative glycemic control and nutritional status on clinical outcomes after total pancreatectomy. World J Gastroenterol. 2017;23(2):265-274. doi:10.3748/wjg.v23.i2.265

Hanazaki K, Yatabe T, Kobayashi M, Tsukamoto Y, Kinoshita Y, Munekage M, Kitagawa H. Perioperative glycemic control using an artificial endocrine pancreas in patients undergoing total pancreatectomy: tight glycemic control may be justified in order to avoid brittle diabetes. Biomed Mater Eng. 2013;23(1-2):109-16. doi: 10.3233/BME-120736.

Hamilton L, Jeyarajah DR. Hemoglobin A1c can be helpful in predicting progression to diabetes after Whipple procedure. HPB (Oxford). 2007;9(1):26-28. doi:10.1080/13651820600917286.

Udhayachandhar R, Otokwala J, Korula PJ, Rymbai M, Chandy TT, Joseph P. Perioperative factors impacting intensive care outcomes following Whipple procedure: A retrospective study. Indian J Anaesth. 2020;64(3):216-221. doi:10.4103/ija.IJA_727_19

Reviewer D

Hussein et al. have reviewed the Nationwide Readmission Database to assess the association between the presence of preoperative DM status and postoperative morbidity and mortality among patients who underwent major pancreatic resections. Although this is a very interesting study, the reviewer has some concerns about the interpretation of the study results.

Comment 1: In the abstract, the conclusion shown is not supported by the data in the

result section.
Reply 1: Thank you for the note, we added more data in the results section of abstract that is covered in the conclusion (See page 2, lines 36-38).

Comment 2: In the method, the reviewer needs a more detailed explanation for the eligibility status of the patients: why was 30-days readmission evaluated among those who had surgery within the first 11 months and 90-days readmission evaluated among those who had surgery within the first 9 months?
Reply 2: Done as advised. We added an explanation of selection of these duration (See page 4, Lines 82-87) in a separate section. Patients in NRD database can't be traced cross calendar years, therefore, to identify readmissions within 30 months, we excluded admissions in December. Similarly, to identify 90 days readmission, we excluded the last 3 months in the year.

Comment 3: In the method, what is the definition of "controlled" DM and "uncontrolled" DM? Also, did the complication include any severity of complications such as the Clavien-Dindo grade I to IV or those of specific severity?
Reply 3: Details on patients' diagnosis and comorbidities are ICD9 coded. Being controlled or uncontrolled, type of diabetes, complicated or uncomplicated diabetes were coded in the database as shown in the Supplementary Table below. Unfortunately, identifying more details from the database is not feasible. Data for each hospital is concealed for deidentification of patients. Patients were meticulously diagnosed in their corresponding hospitals and coders define the code which specify the type of diabetes, whether controlled or not, complicated or uncomplicated.

Variables	**Codes**
Diabetes	250 Diabetes mellitus 2500 DM, Uncomplicated 2501 – 2509 DM, Complicated
Type I: (controlled, uncontrolled)	25001, 25003, 25011, 25013, 25021, 25023, 25031, 25033, 25041, 25043, 25051, 25053, 25061, 25063, 25071, 25073, 25081, 25083, 25091, 25093
Type II: (controlled, uncontrolled)	25000, 25002, 25010, 25012, 25020, 25022, 25030, 25032, 25040, 25042, 25050, 25052, 25060, 25062, 25070, 25072, 25080, 25082, 25090, 25092
Controlled, vs Uncontrolled	24900, 24901, 24910, 24912, 24920, 24922, 24930, 24932, 24940, 24942, 24950, 24952, 24960, 24962, 24970, 24972, 24980, 24982, 24990, 24992

Comment 4: What does "prolonged hospital stays during their 30-day and 90-day readmissions" (line 153) stand for?
Reply 4: We referred the sentence to Figure 5A for clarification and added the exact quantitative values (See page 7, lines 172-174). We also clarified the cutoff used in the analysis in the statistical analysis method (See page 5, lines 112-114).

Comment 5: In the result, the authors compared morbidity between type 1 and type 2 diabetes patients (line 123-). However, patient background and reason of pancreatectomy may be different between patients with type 1 and 2 diabetes, and the reviewer concern that this comparison and authors' conclusion that type 1 diabetes is a risk of complication (line 163-4) could mislead the readers.

Reply 5: We agree with the reviewer comments, authors originally stratify the patients according to the type of diabetes as shown below (capture of old unsubmitted table), but we made the table shorter in the submitted version of the article for two reasons (1) to show only the outcomes stated in the methodology. (2) These variables including patient characteristics and reason of the operation were adjusted and taken into considerations in the multivariate regression models as shown in Table 3.

Table 2. Stratification analysis of diabetic patients according to their diabetic status.

Characteristics	Levels	Type of diabetes		P value	Diabetic control		P value	Diabetic complications		P value
		T1DM	T2DM		Controlled	Uncontrolled		Uncomplicated	Complicated	
Age (year)	Mean ± SD	46.73 ± 13.39	61.95 ± 12.45	**<0.001**	60.08 ± 13.59	61.32 ± 12.05	0.20	58.96 ± 14.09	54.16 ± 15.37	**<0.001**
Gender	Male	101 (60.5)	1030 (53.1)	**0.040**	1089 (53.9)	104 (49.3)	0.21	3934 (48.1)	204 (57.5)	**<0.001**
	Female	66 (39.5)	908 (46.9)		932 (46.1)	107 (50.7)		4240 (51.9)	151 (42.5)	
Median annual household income	Quartile 1 lowest	45 (27.3)	537 (28.5)	**0.021**	569 (28.9)	56 (27.2)	0.09	1882 (23.6)	92 (26.2)	0.09
	Quartile 2	44 (26.7)	423 (22.4)		451 (22.9)	56 (27.2)		1912 (24)	89 (25.4)	
	Quartile 3	27 (16.4)	491 (26)		484 (24.6)	59 (28.6)		1991 (24.9)	67 (19.1)	
	Quartile 4 highest	49 (29.7)	434 (23)		466 (23.7)	35 (17)		2198 (27.5)	103 (29.3)	
Residence in hospital state	Different state	18 (10.7)	212 (10.9)	0.92	227 (11.2)	18 (8.5)	0.29	1272 (15.6)	38 (10.7)	**0.013**
	Same state	150 (89.3)	1726 (89.1)		1795 (88.8)	193 (91.5)		6901 (84.4)	317 (89.3)	
CCIS	0	77 (45.8)	1429 (73.7)	**<0.001**	1466 (72.5)	146 (68.9)	0.52	6503 (79.6)	202 (56.9)	**<0.001**
	1	10 (6)	373 (19.2)		361 (17.9)	43 (20.3)		1314 (16.1)	62 (17.5)	
	≥2	81 (48.2)	136 (7)		194 (9.6)	23 (10.8)		356 (4.4)	91 (25.6)	
Number of chronic diseases	Mean ± SD	6.73 ± 2.72	6.20 ± 2.53	**0.011**	6.20 ± 2.59	6.28 ± 2.12	0.67	4.44 ± 2.62	6.96 ± 2.59	0.06
Type of surgical procedure	Partial pancreatectomy/excision	15 (30.6)	449 (27.2)	**<0.001**	465 (28.3)	32 (18.2)	**<0.001**	2058 (29.7)	51 (24.7)	**0.002**
	Total pancreatectomy	12 (24.5)	56 (3.4)		80 (4.9)	19 (10.8)		264 (3.8)	18 (8.7)	
	Radical pancreaticoduodenectomy	22 (44.9)	1144 (69.4)		1098 (66.8)	125 (71)		4625 (66.6)	137 (66.5)	
Cause of primary admission	Non-cancer	30 (69.8)	528 (38.7)	**<0.001**	558 (41.3)	51 (35.2)	**0.009**	2247 (43)	70 (47.3)	**0.026**
	Cancer	13 (21.1)	837 (61.3)		794 (58.8)	94 (64.9)		2973 (57)	78 (52.7)	
Postoperative complications	None	59 (35.1)	1348 (69.6)	**<0.001**	1329 (65.8)	105 (49.8)	**<0.001**	5823 (71.2)	179 (50.6)	**<0.001**
	One or more	109 (64.9)	590 (30.4)		692 (34.2)	106 (50.2)		2350 (28.8)	175 (49.4)	
Length of stay, days #	Mean ± SD	7.96 ± 3.36	8.14 ± 5.07	0.64	8.03 ± 4.96	9.17 ± 4.28	**0.001**	8.56 ± 10.25	8.10 ± 4.08	0.39
Hospital charge, $	Mean ± SD	239,428.39 ± 186,234.71	86,794.11 ± 86,470.78	**<0.001**	97,705.08 ± 103,531.13	117,873.06 ± 111,847.60	**0.009**	89,443.73 ± 114,836.69	173,351.64 ± 169,721.90	**<0.001**
Hospital costs, $	Mean ± SD	62,592.76 ± 36,238.50	25,511.12 ± 20,248.92	**<0.001**	28,182.21 ± 24,070.27	34,171.04 ± 20,846.61	**0.001**	26,530.02 ± 28,834.56	47,177.01 ± 35,085.96	**<0.001**
Hospital volume	Low	53 (31.7)	685 (35.3)	0.35	710 (35.1)	85 (40.3)	**0.018**	2506 (30.7)	115 (32.4)	0.77
	Medium	76 (45.5)	772 (39.8)		834 (41.3)	66 (31.3)		3708 (45.4)	156 (43.9)	
	High	38 (22.8)	481 (24.8)		477 (23.6)	60 (28.4)		1960 (24)	84 (23.7)	
Hospital Bed Size	Small	16 (9.6)	112 (5.8)	**0.001**	116 (5.7)	20 (9.4)	**0.001**	445 (5.4)	17 (4.8)	**0.001**
	Medium	36 (21.6)	263 (13.6)		300 (14.8)	14 (6.6)		1048 (12.8)	70 (19.7)	
	Large	115 (68.9)	1563 (80.7)		1606 (79.4)	178 (84)		6681 (81.7)	268 (75.5)	