RIZIV convention Complex Surgeries, T_0

(Peri-)pancreatic cancer

Data exploration 2008-2016

&

Patient case mix adjusted OR and HR

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Version 1.2
2019/06/28

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1. (Peri-)pancreatic cancer, patient case mix: 2008-2016.

Table 1. Frequency table of patient and tumour baseline characteristics, N=4,243.

Characteristic	Total	Surgical volume Frequency (Column percent)			p
		low	medium	high	
Overall	4,243	1,194 (100.0)	1,286 (100.0)	1,763 (100.0)	
Gender					0.8653
male	2,294 (54.1)	639 (53.5)	694 (54.0)	961 (54.5)	
females	1,949 (45.9)	555 (46.5)	592 (46.0)	802 (45.5)	
Age					0.0280
<=59	1,147 (27.0)	305 (25.5)	328 (25.5)	514 (29.2)	
60-74	2,111 (49.8)	592 (49.6)	642 (49.9)	877 (49.7)	
75+	985 (23.2)	297 (24.9)	316 (24.6)	372 (21.1)	
Combined stage					<.0001
I/is	844 (19.9)	294 (24.6)	272 (21.2)	278 (15.8)	
II	2,489 (58.7)	661 (55.4)	760 (59.1)	1,068 (60.6)	
III	313 (7.4)	91 (7.6)	90 (7.0)	132 (7.5)	
IV	241 (5.7)	61 (5.1)	60 (4.7)	120 (6.8)	
NA	246 (5.8)	54 (4.5)	75 (5.8)	117 (6.6)	
X	110 (2.6)	33 (2.8)	29 (2.3)	48 (2.7)	
Neuro-endocrine					0.9012
no	3,687 (86.9)	1,042 (87.3)	1,115 (86.7)	1,530 (86.8)	
yes	556 (13.1)	152 (12.7)	171 (13.3)	233 (13.2)	
Topography					<.0001
C170	198 (4.7)	62 (5.2)	56 (4.4)	80 (4.5)	
C240	280 (6.6)	66 (5.5)	91 (7.1)	123 (7.0)	
C241	451 (10.6)	120 (10.1)	156 (12.1)	175 (9.9)	
C250	1,758 (41.4)	463 (38.8)	530 (41.2)	765 (43.4)	
C251	225 (5.3)	50 (4.2)	65 (5.1)	110 (6.2)	
C252	447 (10.5)	126 (10.6)	140 (10.9)	181 (10.3)	
C253	53 (1.2)	11 (0.9)	8 (0.6)	34 (1.9)	
C254	47 (1.1)	12 (1.0)	16 (1.2)	19 (1.1)	
C257	33 (0.8)	14 (1.2)	2 (0.2)	17 (1.0)	
C258	9 (0.2)	3 (0.3)	0 (0.0)	6 (0.3)	
C259	742 (17.5)	267 (22.4)	222 (17.3)	253 (14.4)	
WHO - Performance Status					<.0001
0 – Asymptomatic	638 (15.0)	180 (15.1)	239 (18.6)	219 (12.4)	
1 – Symptomatic but completely ambulatory	2,461 (58.0)	709 (59.4)	782 (60.8)	970 (55.0)	
2 – Symptomatic, <50% in bed during the day	195 (4.6)	69 (5.8)	75 (5.8)	51 (2.9)	
3 – Symptomatic, >50% in bed, but not bedbound	29 (0.7)	12 (1.0)	14 (1.1)	3 (0.2)	

Characteristic	Total	Surgical volume Frequency (Column percent)			p
		low	medium	high	
4 – Bedbound	18 (0.4)	0 (0.0)	1 (0.1)	17 (1.0)	
Missing	902 (21.3)	224 (18.8)	175 (13.6)	503 (28.5)	
Diabetic					0.1728
no	3,284 (77.4)	902 (75.5)	999 (77.7)	1,383 (78.4)	
yes	959 (22.6)	292 (24.5)	287 (22.3)	380 (21.6)	
Cardiovascular disease					0.0453
no	1,980 (46.7)	523 (43.8)	603 (46.9)	854 (48.4)	
yes	2,263 (53.3)	671 (56.2)	683 (53.1)	909 (51.6)	
Respiratory disease					0.7557
no	4,014 (94.6)	1,130 (94.6)	1,221 (94.9)	1,663 (94.3)	
yes	229 (5.4)	64 (5.4)	65 (5.1)	100 (5.7)	
Previous number of hospitalisations					0.1415
none	2,542 (59.9)	743 (62.2)	772 (60.0)	1,027 (58.3)	
1 hosp	910 (21.4)	245 (20.5)	290 (22.6)	375 (21.3)	
2 hosp	425 (10.0)	117 (9.8)	119 (9.3)	189 (10.7)	
>2 hosp	366 (8.6)	89 (7.5)	105 (8.2)	172 (9.8)	
Previous inpatient bed days					0.1721
none	2,542 (59.9)	743 (62.2)	772 (60.0)	1,027 (58.3)	
1-5 days	961 (22.6)	254 (21.3)	299 (23.3)	408 (23.1)	
6-15 days	468 (11.0)	119 (10.0)	147 (11.4)	202 (11.5)	
>15 days	272 (6.4)	78 (6.5)	68 (5.3)	126 (7.1)	
Prestation year					0.0057
2008	381 (9.0)	110 (9.2)	131 (10.2)	140 (7.9)	
2009	447 (10.5)	145 (12.1)	120 (9.3)	182 (10.3)	
2010	415 (9.8)	116 (9.7)	126 (9.8)	173 (9.8)	
2011	504 (11.9)	145 (12.1)	142 (11.0)	217 (12.3)	
2012	451 (10.6)	137 (11.5)	134 (10.4)	180 (10.2)	
2013	456 (10.7)	146 (12.2)	115 (8.9)	195 (11.1)	
2014	493 (11.6)	126 (10.6)	172 (13.4)	195 (11.1)	
2015	508 (12.0)	139 (11.6)	151 (11.7)	218 (12.4)	
2016	588 (13.9)	130 (10.9)	195 (15.2)	263 (14.9)	
Region					<.0001
Brussels-Capital region	285 (6.7)	123 (10.3)	26 (2.0)	136 (7.7)	
Flemish Region	2,657 (62.6)	491 (41.1)	1,036 (80.6)	1,130 (64.1)	
Walloon Region	1,301 (30.7)	580 (48.6)	224 (17.4)	497 (28.2)	

2. (Peri-)pancreatic cancer, Start treatment within 28 days (2008-2016).
      See also important note on page 7.

Table 2. (Peri-)pancreatic cancer, Start treatment within 28 days since confirmed diagnosis.

Characteristic	N	N of treatments	%	95% CI	p-value
Overall	4,243	3,037	71.6	[70.2, 72.9]	
Gender					0.6835
male	2,294	1,636	71.3	[69.4, 73.1]	
females	1,949	1,401	71.9	[69.9, 73.9]	
Age					0.3941
<=59	1,147	811	70.7	[68.1, 73.3]	
60-74	2,111	1,531	72.5	[70.6, 74.4]	
75+	985	695	70.6	[67.7, 73.4]	
Combined stage					<.0001
I/is	844	565	66.9	[63.7, 70.1]	
II	2,489	1,868	75.1	[73.3, 76.7]	
III	313	219	70.0	[64.9, 75.1]	
IV	241	152	63.1	[56.8, 69.3]	
NA	246	178	72.4	[66.7, 78.0]	
X	110	55	50.0	[40.9, 59.1]	
Neuro-endocrine					<.0001
no	3,687	2,721	73.8	[72.4, 75.2]	
yes	556	316	56.8	[52.7, 61.0]	
Topography					<.0001
C170	198	114	57.6	[50.5, 64.6]	
C240	280	204	72.9	[67.5, 77.9]	
C241	451	293	65.0	[60.5, 69.4]	
C250	1,758	1,373	78.1	[76.2, 80.0]	
C251	225	138	61.3	[55.1, 67.6]	
C252	447	311	69.6	[65.3, 73.8]	
C253	53	43	81.1	[69.8, 90.6]	
C254	47	33	70.2	[57.4, 83.0]	
C257	33	21	63.6	[45.5, 78.8]	
C258	9	8	88.9	[66.7, 100.0]	
C259	742	499	67.3	[63.9, 70.6]	
WHO - Performance Status					<.0001
0 – Asymptomatic	638	432	67.7	[64.1, 71.3]	
1 – Symptomatic but completely ambulatory	2,461	1,845	75.0	[73.3, 76.7]	
2 – Symptomatic, <50% in bed during the day	195	148	75.9	[69.7, 81.5]	

Characteristic	N	N of treatments	%	95% CI	p-value
			Start treatment within 28 days		
3 – Symptomatic, >50% in bed, but not bedbound	29	22	75.9	[58.6, 89.7]	
4 – Bedbound	18	7	38.9	[16.7, 61.1]	
Missing	902	583	64.6	[61.5, 67.7]	
Diabetic					0.3121
no	3,284	2,363	72.0	[70.4, 73.5]	
yes	959	674	70.3	[67.4, 73.2]	
Cardiovascular disease					0.1563
no	1,980	1,438	72.6	[70.7, 74.6]	
yes	2,263	1,599	70.7	[68.8, 72.5]	
Respiratory disease					0.1003
no	4,014	2,884	71.8	[70.5, 73.2]	
yes	229	153	66.8	[60.7, 72.9]	
Previous number of hospitalisations					0.0850
none	2,542	1,840	72.4	[70.7, 74.1]	
1 hosp	910	623	68.5	[65.4, 71.4]	
2 hosp	425	315	74.1	[69.9, 78.1]	
>2 hosp	366	259	70.8	[66.1, 75.4]	
Previous inpatient bed days					0.2371
none	2,542	1,840	72.4	[70.7, 74.1]	
1-5 days	961	686	71.4	[68.5, 74.2]	
6-15 days	468	317	67.7	[63.5, 72.0]	
>15 days	272	194	71.3	[65.8, 76.5]	
Region					<.0001
Brussels-Capital region	285	156	54.7	[48.8, 60.4]	
Flemish Region	2,657	2,083	78.4	[76.8, 79.9]	
Walloon Region	1,301	798	61.3	[58.6, 64.0]	
Prestation year					0.1325
2008	381	291	76.4	[72.2, 80.6]	
2009	447	309	69.1	[64.9, 73.4]	
2010	415	294	70.8	[66.5, 75.2]	
2011	504	370	73.4	[69.4, 77.2]	
2012	451	326	72.3	[68.1, 76.3]	
2013	456	323	70.8	[66.7, 75.0]	
2014	493	354	71.8	[67.7, 75.7]	
2015	508	373	73.4	[69.5, 77.2]	
2016	588	397	67.5	[63.8, 71.3]	
Surgical volume					<.0001
low	1,194	812	68.0	[65.3, 70.6]	
medium	1,286	980	76.2	[73.9, 78.5]	
high	1,763	1,245	70.6	[68.5, 72.7]	

Figure 1a. (Peri-)pancreatic cancer, Fraction of patients with start treatment within 28 days since confirmed diagnosis by surgical centre.

Important note: Please take into account that almost 1/3 of all patients have the 1st microscopic confirmation of the diagnosis at the day of surgery as a consequence having 0 days between confirmed (histological) diagnosis and first treatment (see figure 1b). This means that the indicator (figure 1a) is not yet representative for the 'time to treatment' and is not appropriate to compare the individual results. Alternative definitions are being explored and will be applied later (taking into account other diagnostic procedures such as CT, MRI, PET, PET-CT, ERCP, EUS…).
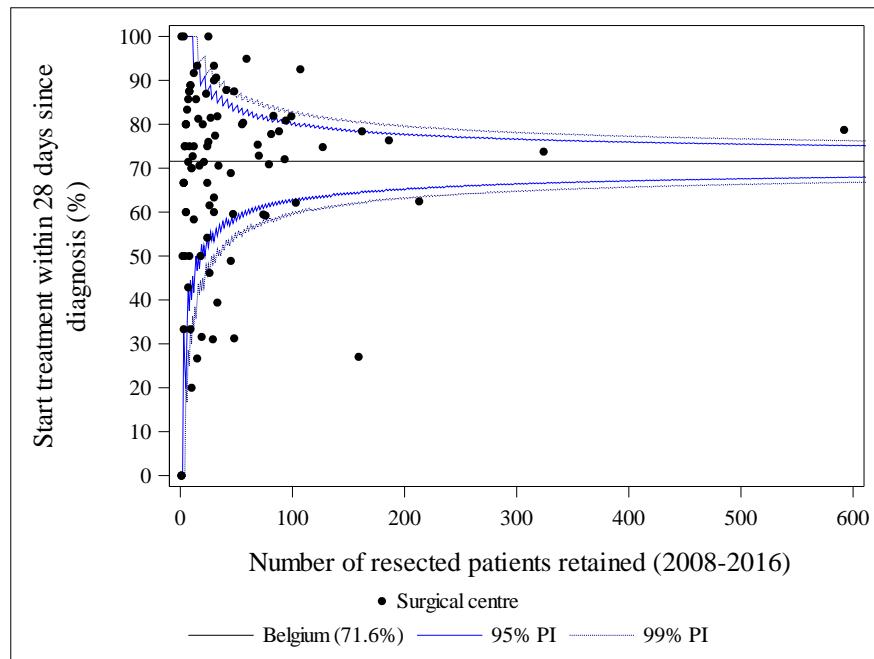

Figure 1b: Distribution of time to first treatment
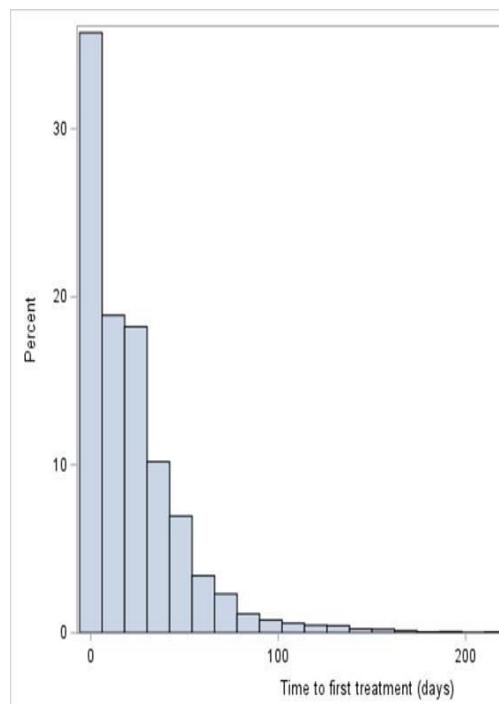
3. (Peri-)pancreatic cancer, in-hospital mortality: 2008-2016.
3.1. (Peri-)pancreatic cancer, unadjusted in-hospital mortality

Table 3. (Peri-)pancreatic cancer, unadjusted in-hospital mortality

Characteristic	N	N of deaths	%	95% CI	p-value
Overall	4,243	251	5.9	[5.2, 6.6]	
Gender					0.0054
male	2,294	157	6.8	[5.8, 7.9]	
females	1,949	94	4.8	[3.9, 5.8]	
Age					<.0001
<=59	1,147	27	2.4	[1.5, 3.2]	
60-74	2,111	129	6.1	[5.1, 7.2]	
75+	985	95	9.6	[7.8, 11.6]	
Combined stage					0.0005
I/is	844	31	3.7	[2.5, 5.0]	
II	2,489	156	6.3	[5.3, 7.2]	
III	313	27	8.6	[5.8, 11.8]	
IV	241	10	4.1	[1.7, 6.6]	
NA	246	24	9.8	[6.1, 13.4]	
X	110	3	2.7	[0.0, 6.4]	
Neuro-endocrine					0.0041
no	3,687	233	6.3	[5.5, 7.1]	
yes	556	18	3.2	[1.8, 4.9]	
Topography					0.0441
C170	198	16	8.1	[4.5, 12.1]	
C240	280	28	10.0	[6.8, 13.6]	
C241	451	29	6.4	[4.2, 8.9]	
C250	1,758	101	5.7	[4.7, 6.9]	
C251	225	12	5.3	[2.7, 8.4]	
C252	447	15	3.4	[1.8, 5.1]	
C253	53	1	1.9	[0.0, 5.7]	
C254	47	2	4.3	[0.0, 10.6]	
C257	33	1	3.0	[0.0, 9.1]	
C258	9	0	0.0	_	
C259	742	46	6.2	[4.6, 8.0]	
WHO - Performance Status					<.0001
0 – Asymptomatic	638	13	2.0	[1.1, 3.1]	
1 – Symptomatic but completely ambulatory	2,461	125	5.1	[4.2, 6.0]	
2 – Symptomatic, <50% in bed during the day	195	19	9.7	[5.6, 13.8]	

Characteristic	N	N of deaths	%	95% CI	p-value
		In-hospital mortality			
3 – Symptomatic, >50% in bed, but not bedbound	29	7	24.1	[10.3, 41.4]	
4 – Bedbound	18	2	11.1	[0.0, 27.8]	
Missing	902	85	9.4	[7.5, 11.4]	
Diabetic					0.0795
no	3,284	183	5.6	[4.8, 6.4]	
yes	959	68	7.1	[5.5, 8.8]	
Cardiovascular disease					<.0001
no	1,980	63	3.2	[2.4, 4.0]	
yes	2,263	188	8.3	[7.2, 9.5]	
Respiratory disease					0.8962
no	4,014	237	5.9	[5.2, 6.7]	
yes	229	14	6.1	[3.1, 9.2]	
Previous number of hospitalisations					0.2626
none	2,542	136	5.4	[4.5, 6.3]	
1 hosp	910	59	6.5	[4.9, 8.1]	
2 hosp	425	31	7.3	[4.9, 9.9]	
>2 hosp	366	25	6.8	[4.4, 9.6]	
Previous inpatient bed days					0.0033
none	2,542	136	5.4	[4.5, 6.3]	
1-5 days	961	50	5.2	[3.9, 6.7]	
6-15 days	468	39	8.3	[6.0, 10.9]	
>15 days	272	26	9.6	[6.3, 13.2]	
Region					0.7102
Brussels-Capital region	285	20	7.0	[4.2, 10.2]	
Flemish Region	2,657	156	5.9	[5.0, 6.8]	
Walloon Region	1,301	75	5.8	[4.5, 7.1]	
Prestation year					0.0740
2008	381	28	7.3	[4.7, 10.0]	
2009	447	19	4.3	[2.5, 6.3]	
2010	415	22	5.3	[3.4, 7.5]	
2011	504	38	7.5	[5.4, 9.9]	
2012	451	37	8.2	[5.8, 10.9]	
2013	456	27	5.9	[3.9, 8.1]	
2014	493	27	5.5	[3.7, 7.5]	
2015	508	29	5.7	[3.7, 7.9]	
2016	588	24	4.1	[2.6, 5.8]	
Surgical volume					<.0001
low	1,194	96	8.0	[6.5, 9.6]	
medium	1,286	89	6.9	[5.6, 8.3]	
high	1,763	66	3.7	[2.9, 4.7]	

Figure 2. (Peri-)pancreatic cancer, unadjusted in-hospital mortality by surgical centre.
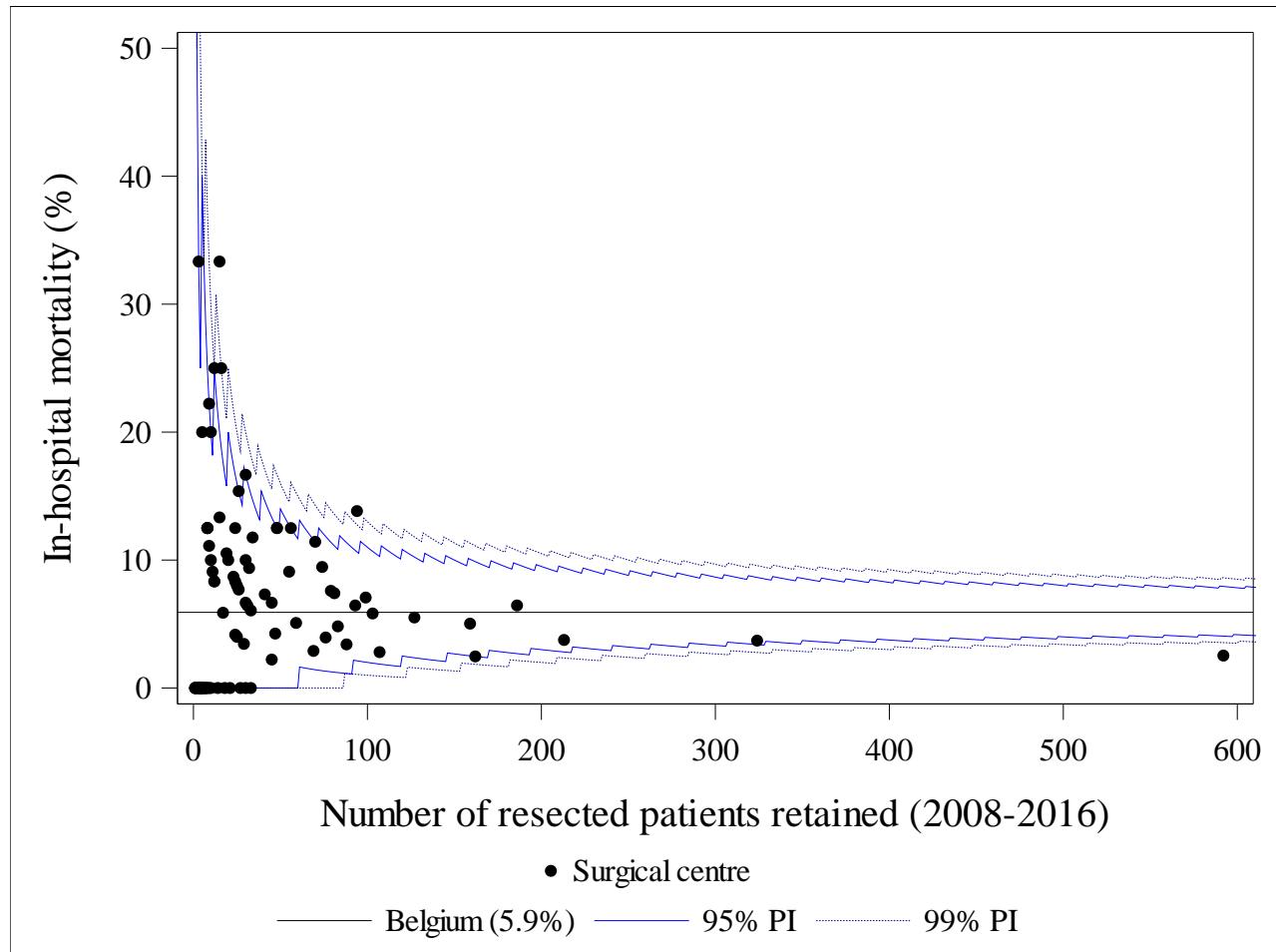
3.2. (Peri-)pancreatic cancer, in-hospital mortality adjusted for patient case mix

Figure 3. (Peri-)pancreatic cancer, Odds Ratio for in-hospital mortality by surgical centre, adjusted for patient case mix.
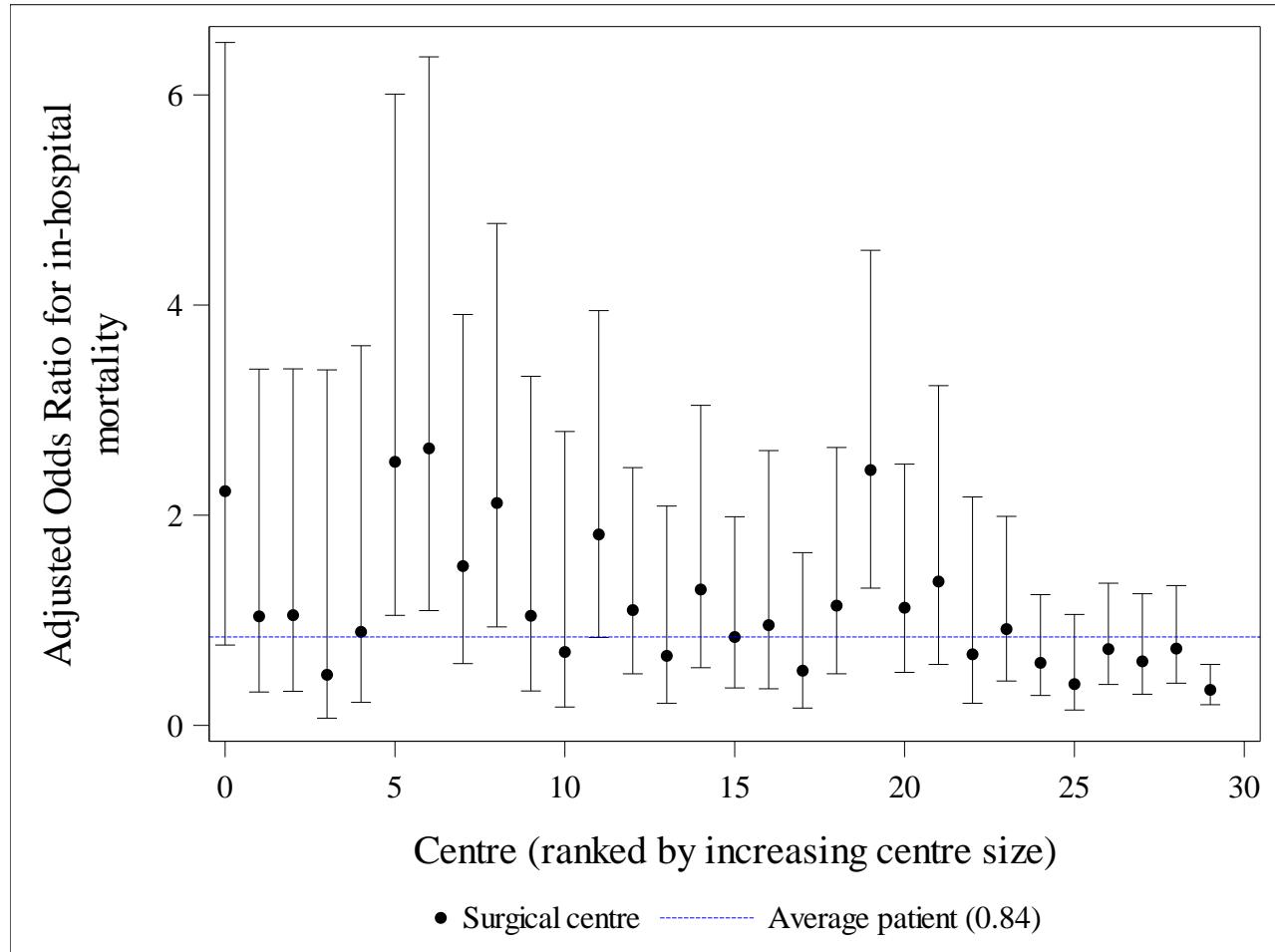
Centres with at least 34 retained patients are shown on the forest plot.

Expected: adjustment for the years / period 2008-2016

4.(Peri-)pancreatic cancer, 30-day postop mortality: 2008-2016
4.1. (Peri-)pancreatic cancer, unadjusted 30-day postop mortality

Table 4. (Peri-)pancreatic cancer, unadjusted 30-day postop mortality

| Characteristic | N | N of deaths | 30-day postop mortality | | p-value |
			%	95% CI	
Overall	4,240	182	4.3	[3.7, 4.9]	
Gender					0.0551
male	2,292	111	4.8	[4.0, 5.8]	
females	1,948	71	3.6	[2.8, 4.5]	
Age					<.0001
<=59	1,144	26	2.3	[1.5, 3.1]	
60-74	2,111	93	4.4	[3.6, 5.3]	
75+	985	63	6.4	[4.9, 7.9]	
Combined stage					0.0012
I/is	842	19	2.3	[1.3, 3.3]	
II	2,489	115	4.6	[3.8, 5.5]	
III	312	23	7.4	[4.5, 10.3]	
IV	241	7	2.9	[0.8, 5.4]	
NA	246	15	6.1	[3.3, 9.3]	
X	110	3	2.7	[0.0, 6.4]	
Neuro-endocrine					0.0466
no	3,684	167	4.5	[3.9, 5.2]	
yes	556	15	2.7	[1.4, 4.1]	
Topography					0.0562
C170	198	16	8.1	[4.5, 12.1]	
C240	280	16	5.7	[3.2, 8.6]	
C241	450	23	5.1	[3.1, 7.3]	
C250	1,758	75	4.3	[3.4, 5.2]	
C251	225	4	1.8	[0.4, 3.6]	
C252	447	11	2.5	[1.1, 4.0]	
C253	53	1	1.9	[0.0, 5.7]	
C254	47	3	6.4	[0.0, 14.9]	
C257	33	1	3.0	[0.0, 9.1]	
C258	9	0	0.0	_	
C259	740	32	4.3	[3.0, 5.8]	
WHO - Performance Status					<.0001
0 – Asymptomatic	638	10	1.6	[0.6, 2.7]	
1 – Symptomatic but completely ambulatory	2,458	89	3.6	[2.9, 4.4]	

			30-day postop mortality		
Characteristic	**N**	**N of deaths**	**%**	**95% CI**	**p-value**
2 – Symptomatic, <50% in bed during the day	195	15	7.7	[4.1, 11.8]	
3 – Symptomatic, >50% in bed, but not bedbound	29	3	10.3	[0.0, 24.1]	
4 – Bedbound	18	2	11.1	[0.0, 27.8]	
Missing	902	63	7.0	[5.3, 8.6]	
Diabetic					0.1535
no	3,282	133	4.1	[3.4, 4.8]	
yes	958	49	5.1	[3.8, 6.6]	
Cardiovascular disease					<.0001
no	1,979	43	2.2	[1.6, 2.8]	
yes	2,261	139	6.1	[5.2, 7.2]	
Respiratory disease					0.9545
no	4,011	172	4.3	[3.7, 4.9]	
yes	229	10	4.4	[1.7, 7.0]	
Previous number of hospitalisations					0.2846
none	2,542	97	3.8	[3.1, 4.6]	
1 hosp	907	45	5.0	[3.6, 6.4]	
2 hosp	425	20	4.7	[2.8, 6.8]	
>2 hosp	366	20	5.5	[3.3, 7.9]	
Previous inpatient bed days					0.0229
none	2,542	97	3.8	[3.1, 4.6]	
1-5 days	958	39	4.1	[2.8, 5.3]	
6-15 days	468	26	5.6	[3.6, 7.7]	
>15 days	272	20	7.4	[4.4, 10.7]	
Region					0.2398
Brussels-Capital region	282	12	4.3	[2.1, 6.7]	
Flemish Region	2,657	104	3.9	[3.2, 4.7]	
Walloon Region	1,301	66	5.1	[3.9, 6.3]	
Prestation year					0.2120
2008	380	19	5.0	[2.9, 7.4]	
2009	447	11	2.5	[1.1, 4.0]	
2010	415	15	3.6	[1.9, 5.5]	
2011	504	28	5.6	[3.6, 7.5]	
2012	449	23	5.1	[3.1, 7.3]	
2013	456	19	4.2	[2.4, 6.1]	
2014	493	20	4.1	[2.4, 5.9]	
2015	508	28	5.5	[3.5, 7.5]	
2016	588	19	3.2	[1.9, 4.8]	
Surgical volume					<.0001
low	1,192	69	5.8	[4.5, 7.1]	

			30-day postop mortality		
Characteristic	N	N of deaths	%	95% CI	p-value
medium	1,286	66	5.1	[4.0, 6.4]	
high	1,762	47	2.7	[1.9, 3.5]	

3 patients were censored within 30 days since surgery and were therefore omited for the 30-day postop mortality analysis

Figure 4. (Peri-)pancreatic cancer, unadjusted 30-day postop mortality by surgical centre.
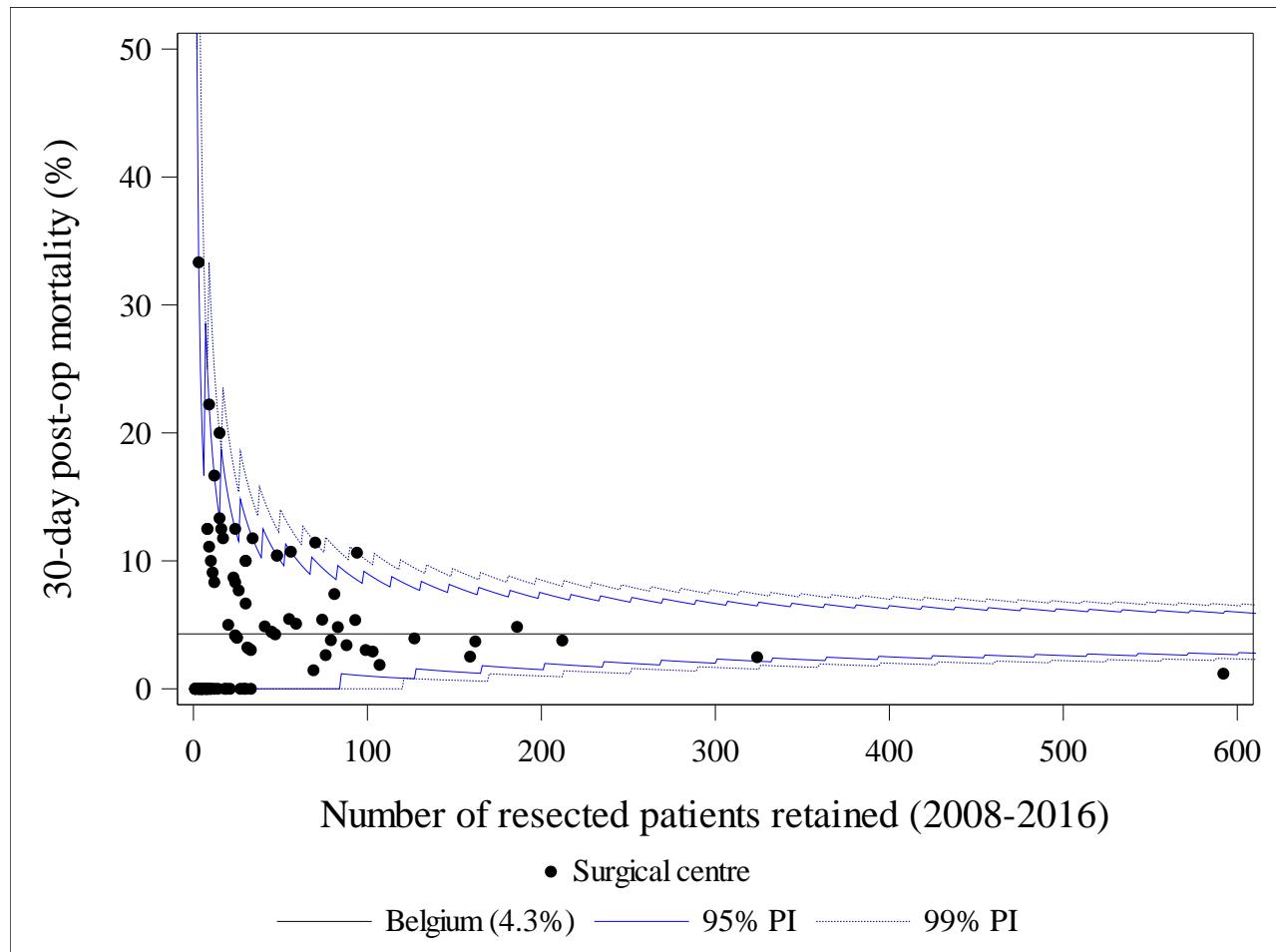
4.2. (Peri-)pancreatic cancer, 30-day postop mortality adjusted for patient case mix

Figure 5. (Peri-)pancreatic cancer, Odds Ratio for 30-day postop mortality by surgical centre, adjusted for patient case mix.
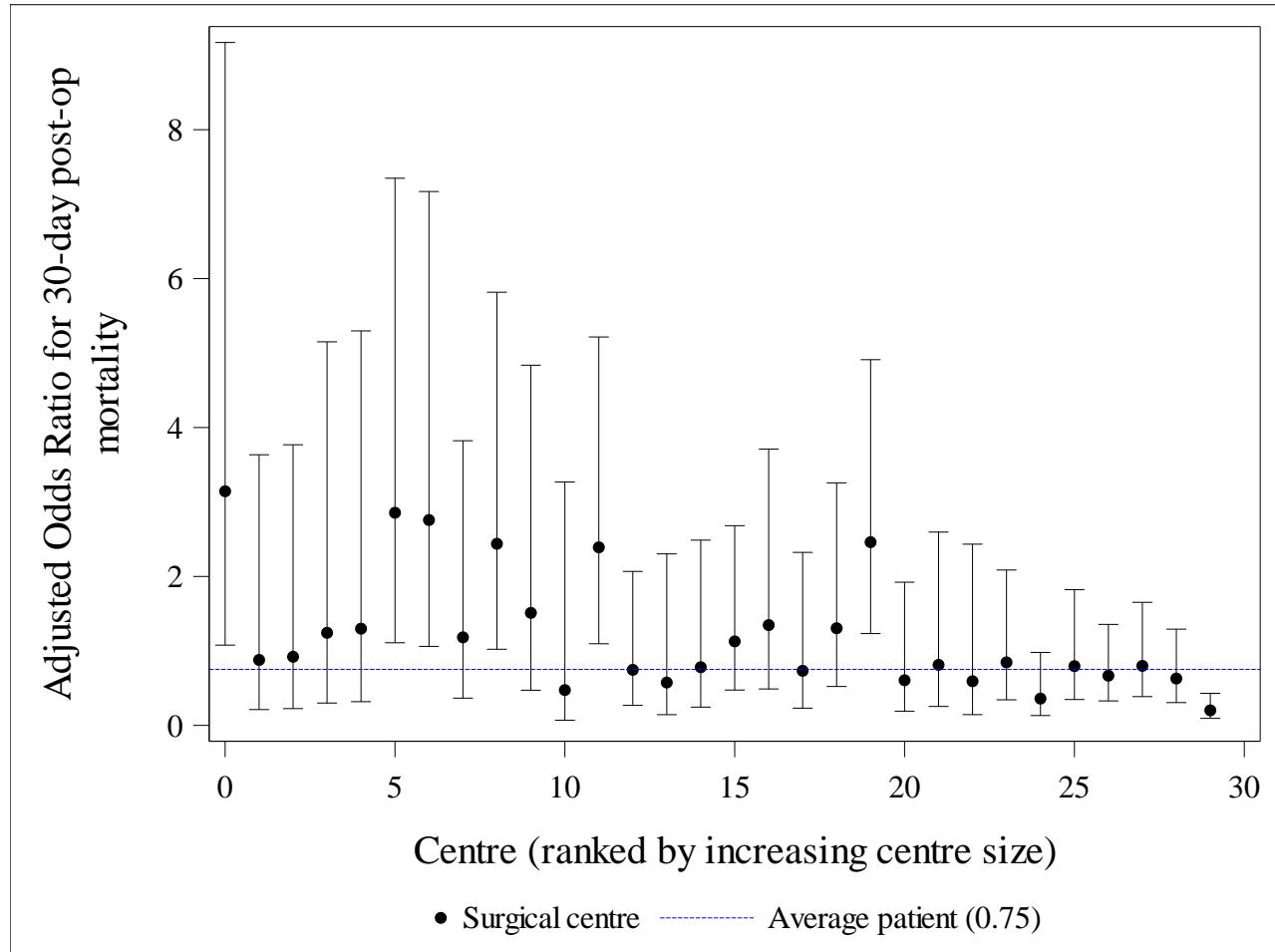
Centres with at least 34 retained patients are shown on the forest plot.
Expected: adjustment for the years / period 2008-2016

5.(Peri-)pancreatic cancer, 90-day postop mortality: 2008-2016
5.1. (Peri-)pancreatic cancer, unadjusted 90-day postop mortality

Table 5. (Peri-)pancreatic cancer, unadjusted 90-day postop mortality

Characteristic	N	N of deaths	%	95% CI	p-value
			90-day postop mortality		
Overall	4,239	334	7.9	[7.1, 8.7]	
Gender					0.0101
male	2,291	203	8.9	[7.7, 10.0]	
females	1,948	131	6.7	[5.6, 7.9]	
Age					<.0001
<=59	1,144	35	3.1	[2.1, 4.1]	
60-74	2,111	177	8.4	[7.2, 9.6]	
75+	984	122	12.4	[10.4, 14.5]	
Combined stage					<.0001
I/is	842	37	4.4	[3.1, 5.8]	
II	2,489	208	8.4	[7.3, 9.4]	
III	312	41	13.1	[9.6, 17.0]	
IV	240	14	5.8	[2.9, 8.8]	
NA	246	29	11.8	[7.7, 15.9]	
X	110	5	4.5	[0.9, 9.1]	
Neuro-endocrine					0.0002
no	3,683	312	8.5	[7.6, 9.4]	
yes	556	22	4.0	[2.3, 5.6]	
Topography					0.0899
C170	198	23	11.6	[7.6, 16.2]	
C240	280	31	11.1	[7.5, 15.0]	
C241	450	32	7.1	[4.9, 9.6]	
C250	1,758	149	8.5	[7.2, 9.8]	
C251	224	15	6.7	[3.6, 10.3]	
C252	447	25	5.6	[3.6, 7.8]	
C253	53	2	3.8	[0.0, 9.4]	
C254	47	3	6.4	[0.0, 14.9]	
C257	33	1	3.0	[0.0, 9.1]	
C258	9	0	0.0	_	
C259	740	53	7.2	[5.4, 9.1]	
WHO - Performance Status					<.0001
0 – Asymptomatic	637	24	3.8	[2.4, 5.3]	
1 – Symptomatic but completely ambulatory	2,458	175	7.1	[6.1, 8.1]	

Characteristic	N	N of deaths	%	95% CI	p-value
			90-day postop mortality		
2 – Symptomatic, <50% in bed during the day	195	24	12.3	[7.7, 16.9]	
3 – Symptomatic, >50% in bed, but not bedbound	29	6	20.7	[6.9, 37.9]	
4 – Bedbound	18	2	11.1	[0.0, 27.8]	
Missing	902	103	11.4	[9.4, 13.5]	
Diabetic					0.0052
no	3,281	238	7.3	[6.4, 8.2]	
yes	958	96	10.0	[8.1, 12.0]	
Cardiovascular disease					<.0001
no	1,979	95	4.8	[3.9, 5.8]	
yes	2,260	239	10.6	[9.3, 11.9]	
Respiratory disease					0.8094
no	4,010	315	7.9	[7.0, 8.7]	
yes	229	19	8.3	[4.8, 12.2]	
Previous number of hospitalisations					0.3820
none	2,541	189	7.4	[6.4, 8.5]	
1 hosp	907	71	7.8	[6.2, 9.6]	
2 hosp	425	40	9.4	[6.8, 12.2]	
>2 hosp	366	34	9.3	[6.6, 12.3]	
Previous inpatient bed days					0.0003
none	2,541	189	7.4	[6.4, 8.5]	
1-5 days	958	64	6.7	[5.1, 8.4]	
6-15 days	468	42	9.0	[6.4, 11.5]	
>15 days	272	39	14.3	[10.3, 18.8]	
Region					0.7836
Brussels-Capital region	281	22	7.8	[5.0, 11.0]	
Flemish Region	2,657	215	8.1	[7.1, 9.1]	
Walloon Region	1,301	97	7.5	[6.1, 8.9]	
Prestation year					0.0309
2008	380	36	9.5	[6.6, 12.6]	
2009	447	20	4.5	[2.7, 6.5]	
2010	415	33	8.0	[5.5, 10.6]	
2011	504	49	9.7	[7.1, 12.3]	
2012	448	46	10.3	[7.6, 13.2]	
2013	456	35	7.7	[5.3, 10.3]	
2014	493	38	7.7	[5.5, 10.1]	
2015	508	41	8.1	[5.7, 10.4]	
2016	588	36	6.1	[4.3, 8.2]	
Surgical volume					<.0001
low	1,192	122	10.2	[8.6, 12.0]	

Characteristic	N	N of deaths	%	95% CI	p-value
			90-day postop mortality		
medium	1,285	116	9.0	[7.5, 10.7]	
high	1,762	96	5.4	[4.4, 6.5]	

4 patients were censored within 90 days since surgery and were therefore omited for the 90-day postop mortality analysis

Figure 6. (Peri-)pancreatic cancer, unadjusted 90-day postop mortality by surgical centre.
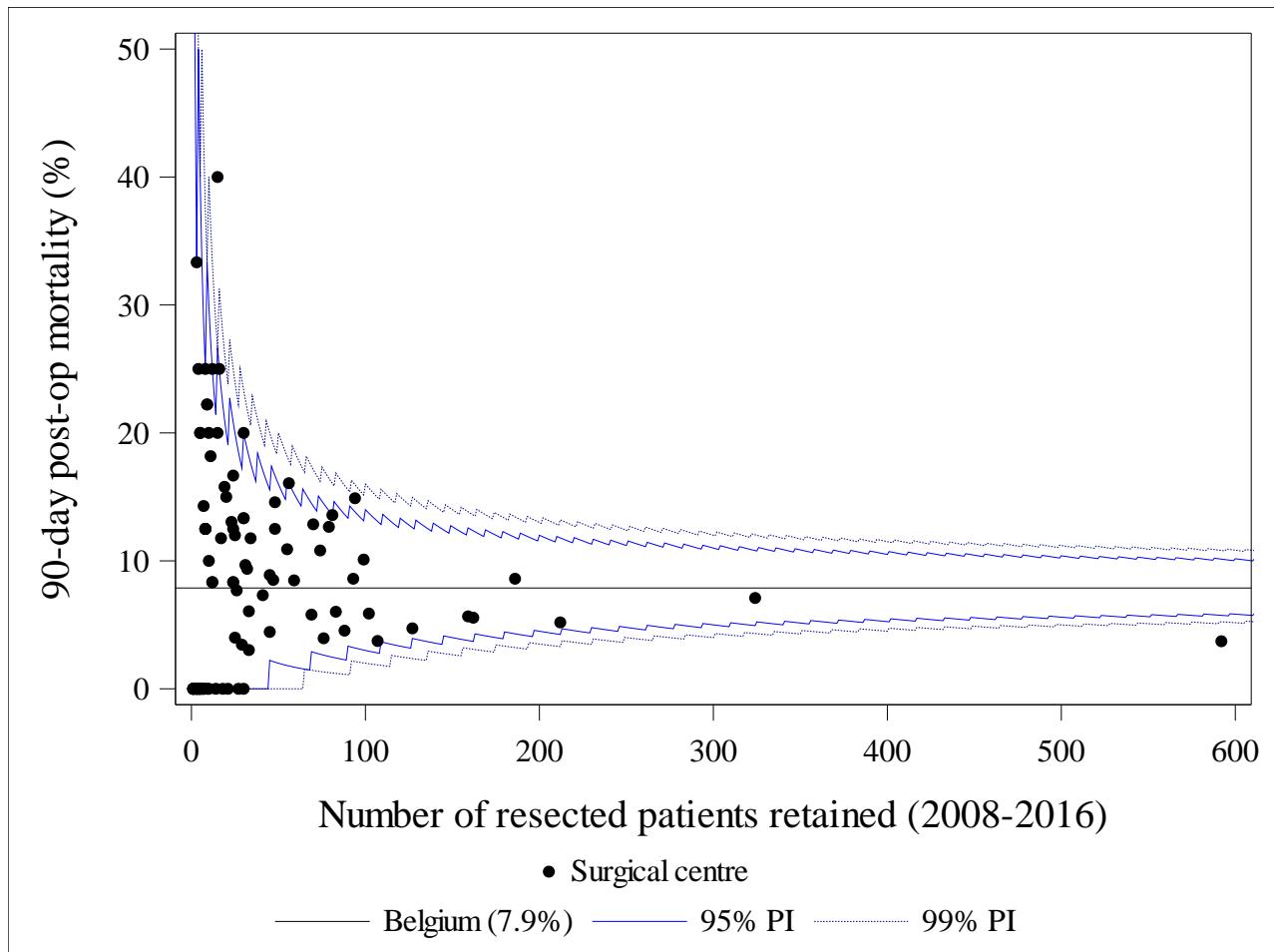
5.2. (Peri-)pancreatic cancer, 90-day postop mortality adjusted for patient case mix

Figure 7. (Peri-)pancreatic cancer, Odds Ratio for 90-day postop mortality by surgical centre, adjusted for patient case mix.
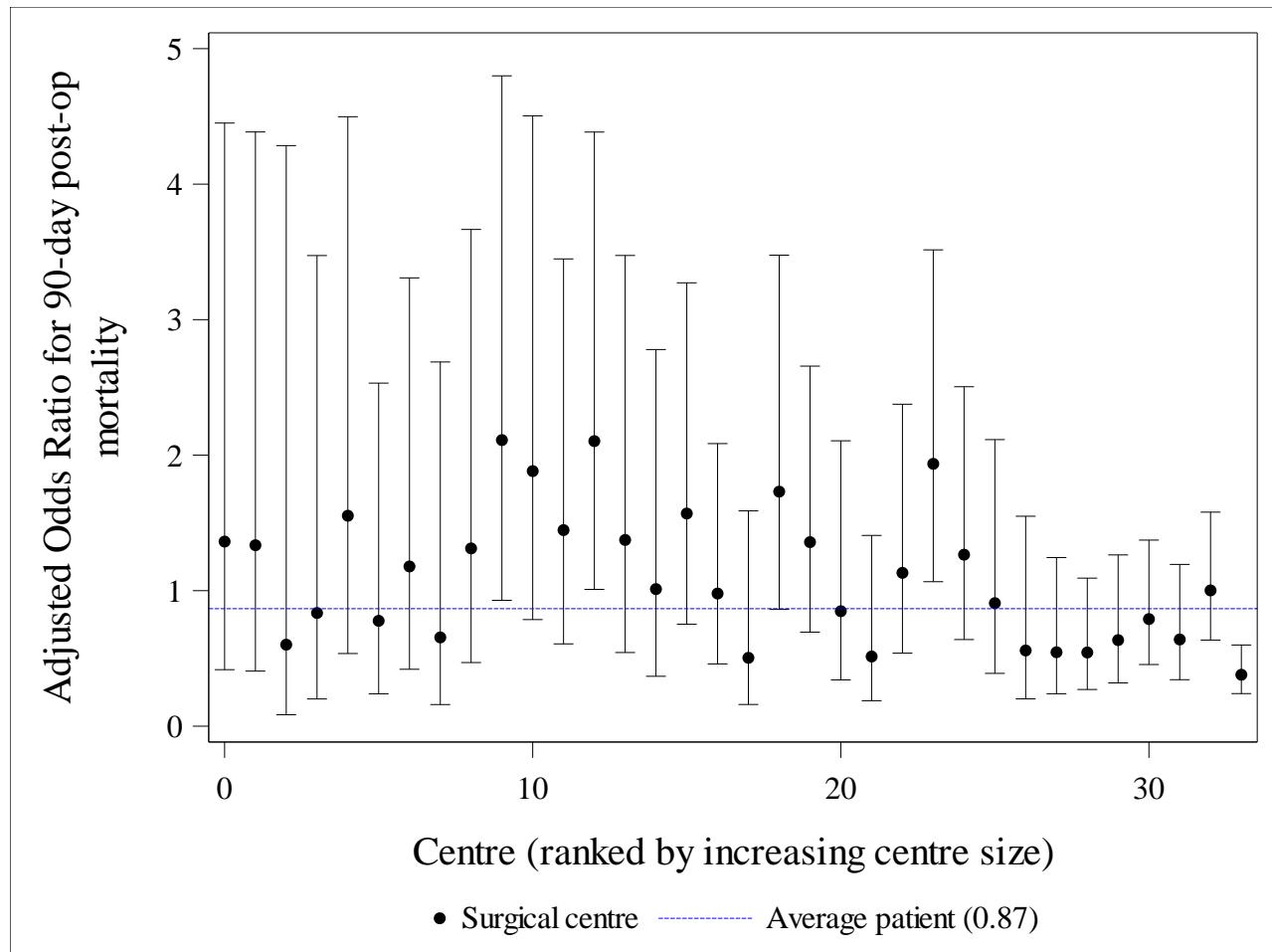
Centres with at least 31 retained patients are shown on the forest plot.

Expected: adjustment for the years/period 2008-2016

6.(Peri-)pancreatic cancer, Observed survival or all-cause survival: 2008-2016
6.1. (Peri-)pancreatic cancer, unadjusted observed survival

Table 6. (Peri-)pancreatic cancer, number of events, total person years and rate for OS.

Surgical volume	N deaths	Person Years	Rate
All patients	2763	11738.839	0.2354
low	808	3268.3368	0.2472
medium	838	3432.3587	0.2441
high	1117	5038.1437	0.2217

Table 7. (Peri-)pancreatic cancer, unadjusted observed survival proportions.

		Unadjusted observed survival since surgery, %						
		1 year		3 year		5 year		
Characteristic	Initial number at risk	estimate	95% CI	estimate	95% CI	estimate	95% CI	p-value
Overall	4236	72.9	[71.6, 74.2]	42.5	[41.0, 44.1]	32.6	[31.0, 34.1]	
Gender								0.3531
male	2288	72.6	[70.7, 74.4]	42.0	[39.9, 44.1]	32.3	[30.2, 34.4]	
females	1948	73.3	[71.3, 75.2]	43.2	[40.9, 45.5]	32.8	[30.5, 35.2]	
Age								<.0001
<=59	1144	83.8	[81.6, 85.8]	56.1	[53.1, 59.0]	45.8	[42.6, 49.0]	
60-74	2108	72.9	[71.0, 74.8]	40.6	[38.5, 42.8]	30.4	[28.2, 32.6]	
75+	984	60.2	[57.1, 63.2]	30.7	[27.8, 33.7]	21.4	[18.6, 24.4]	
Combined stage								<.0001
I/is	842	89.2	[86.9, 91.1]	74.5	[71.4, 77.4]	65.1	[61.4, 68.5]	
II	2486	69.3	[67.4, 71.0]	32.9	[31.0, 34.8]	22.0	[20.2, 23.9]	
III	312	61.9	[56.2, 67.0]	26.3	[21.2, 31.7]	18.4	[13.6, 23.8]	
IV	241	57.9	[51.4, 63.9]	24.7	[19.3, 30.5]	14.2	[9.6, 19.5]	
NA	245	75.9	[70.1, 80.8]	48.5	[41.8, 54.7]	35.9	[28.9, 43.0]	
X	110	89.0	[81.5, 93.6]	83.4	[75.0, 89.2]	82.3	[73.7, 88.4]	
Neuro-endocrine								<.0001
no	3680	70.0	[68.5, 71.4]	36.0	[34.4, 37.7]	25.1	[23.5, 26.7]	
yes	556	92.4	[89.9, 94.4]	85.8	[82.5, 88.5]	81.9	[78.1, 85.0]	
WHO - Performance Status								<.0001
0 – Asymptomatic	638	79.8	[76.4, 82.7]	49.7	[45.6, 53.7]	39.7	[35.5, 43.9]	
1 – Symptomatic but completely ambulatory	2458	72.1	[70.3, 73.8]	40.6	[38.6, 42.7]	30.0	[28.0, 32.1]	

Characteristic	Initial number at risk	Unadjusted observed survival since surgery, %						p-value
		1 year		3 year		5 year		
		estimate	95% CI	estimate	95% CI	estimate	95% CI	
2 – Symptomatic, <50% in bed during the day	195	64.1	[56.9, 70.4]	28.7	[22.4, 35.4]	15.3	[9.4, 22.4]	
3 – Symptomatic, >50% in bed, but not bedbound	28	46.4	[27.6, 63.3]	20.4	[7.8, 37.1]	20.4	[7.8, 37.1]	
4 – Bedbound	18	83.3	[56.8, 94.3]	61.9	[31.9, 81.8]			
Missing	899	73.0	[69.9, 75.7]	45.8	[42.5, 49.1]	37.6	[34.2, 41.0]	
Topography								<.0001
C170	198	79.8	[73.5, 84.8]	62.1	[54.7, 68.5]	51.3	[43.3, 58.7]	
C240	279	74.9	[69.4, 79.6]	42.1	[36.0, 48.0]	31.0	[25.0, 37.1]	
C241	450	84.4	[80.8, 87.5]	58.5	[53.5, 63.1]	47.5	[42.2, 52.6]	
C250	1756	66.2	[64.0, 68.4]	30.3	[28.1, 32.5]	18.3	[16.3, 20.5]	
C251	225	73.7	[67.4, 78.9]	41.0	[34.3, 47.5]	37.3	[30.6, 44.1]	
C252	446	79.8	[75.7, 83.2]	59.5	[54.6, 64.0]	52.3	[47.1, 57.2]	
C253	53	81.1	[67.8, 89.4]	44.5	[30.8, 57.4]	35.3	[22.4, 48.6]	
C254	47	93.6	[81.5, 97.9]	89.1	[75.7, 95.3]	81.1	[65.5, 90.2]	
C257	33	84.8	[67.4, 93.4]	40.7	[23.6, 57.1]	35.6	[18.7, 52.9]	
C258	9	88.9	[43.3, 98.4]	77.8	[36.5, 93.9]	77.8	[36.5, 93.9]	
C259	740	72.3	[68.9, 75.4]	43.8	[40.1, 47.4]	35.4	[31.8, 39.1]	
Diabetic								<.0001
no	3281	74.3	[72.8, 75.8]	44.6	[42.8, 46.3]	34.3	[32.5, 36.1]	
yes	955	68.1	[65.1, 71.0]	35.4	[32.2, 38.6]	26.4	[23.3, 29.6]	
Cardiovascular disease								<.0001
no	1977	78.1	[76.2, 79.9]	48.1	[45.8, 50.3]	38.2	[35.9, 40.6]	
yes	2259	68.4	[66.4, 70.3]	37.6	[35.6, 39.7]	27.5	[25.4, 29.6]	
Respiratory disease								0.0132
no	4007	73.3	[71.9, 74.6]	42.8	[41.3, 44.4]	32.9	[31.3, 34.5]	
yes	229	66.4	[59.9, 72.1]	36.9	[30.3, 43.4]	25.9	[19.7, 32.6]	
Previous number of hospitalisations								0.3736
none	2539	73.7	[71.9, 75.3]	41.7	[39.7, 43.7]	31.0	[29.0, 33.0]	
1 hosp	907	73.6	[70.7, 76.4]	44.3	[41.0, 47.6]	34.1	[30.7, 37.5]	
2 hosp	424	73.1	[68.6, 77.0]	44.9	[39.9, 49.7]	37.4	[32.4, 42.3]	
>2 hosp	366	65.8	[60.7, 70.5]	41.2	[35.9, 46.3]	34.7	[29.4, 40.1]	
Previous inpatient bed days								0.0048
none	2539	73.7	[71.9, 75.3]	41.7	[39.7, 43.7]	31.0	[29.0, 33.0]	
1-5 days	958	75.2	[72.4, 77.9]	46.5	[43.2, 49.7]	35.9	[32.5, 39.3]	
6-15 days	467	71.5	[67.2, 75.4]	42.9	[38.2, 47.5]	35.8	[31.2, 40.5]	
>15 days	272	60.3	[54.2, 65.8]	35.7	[29.9, 41.6]	29.9	[24.2, 35.8]	
Region								0.2174

Characteristic	Initial number at risk	Unadjusted observed survival since surgery, %						
		1 year		3 year		5 year		
		estimate	95% CI	estimate	95% CI	estimate	95% CI	p-value
Brussels-Capital region	280	70.6	[64.8, 75.5]	38.1	[32.2, 43.9]	27.7	[22.0, 33.7]	
Flemish Region	2657	72.7	[71.0, 74.4]	42.7	[40.8, 44.7]	32.9	[31.0, 34.9]	
Walloon Region	1299	73.9	[71.4, 76.2]	43.0	[40.2, 45.8]	32.8	[30.0, 35.6]	
Prestation year								0.0201
2008	380	71.3	[66.5, 75.6]	37.6	[32.7, 42.4]	28.9	[24.4, 33.5]	
2009	447	74.2	[69.9, 78.0]	41.5	[36.9, 46.0]	32.3	[28.0, 36.7]	
2010	415	69.2	[64.5, 73.4]	41.9	[37.2, 46.6]	30.4	[26.0, 34.8]	
2011	502	70.5	[66.3, 74.3]	39.0	[34.8, 43.3]	28.8	[24.9, 32.8]	
2012	448	71.1	[66.7, 75.1]	42.4	[37.8, 46.9]	33.0	[28.7, 37.4]	
2013	456	73.2	[68.9, 77.1]	44.9	[40.2, 49.4]	35.8	[31.3, 40.2]	
2014	493	75.5	[71.4, 79.0]	43.4	[39.0, 47.7]			
2015	507	73.6	[69.5, 77.2]	43.8	[39.3, 48.2]			
2016	588	76.2	[72.5, 79.4]					
Surgical volume								0.0122
low	1190	69.2	[66.5, 71.8]	40.0	[37.2, 42.9]	30.7	[27.9, 33.6]	
medium	1284	71.5	[68.9, 73.9]	41.8	[39.0, 44.6]	32.7	[29.8, 35.6]	
high	1762	76.5	[74.4, 78.4]	44.8	[42.4, 47.2]	33.7	[31.3, 36.2]	

7 patients were censored or died at the day of surgery and were therefore omited for the Observed Survival analysis

6.2. (Peri-)pancreatic cancer, unadjusted 5 year observed survival by surgical centre

Figure 8. (Peri-)pancreatic cancer, unadjusted 5 year observed survival by surgical centre.
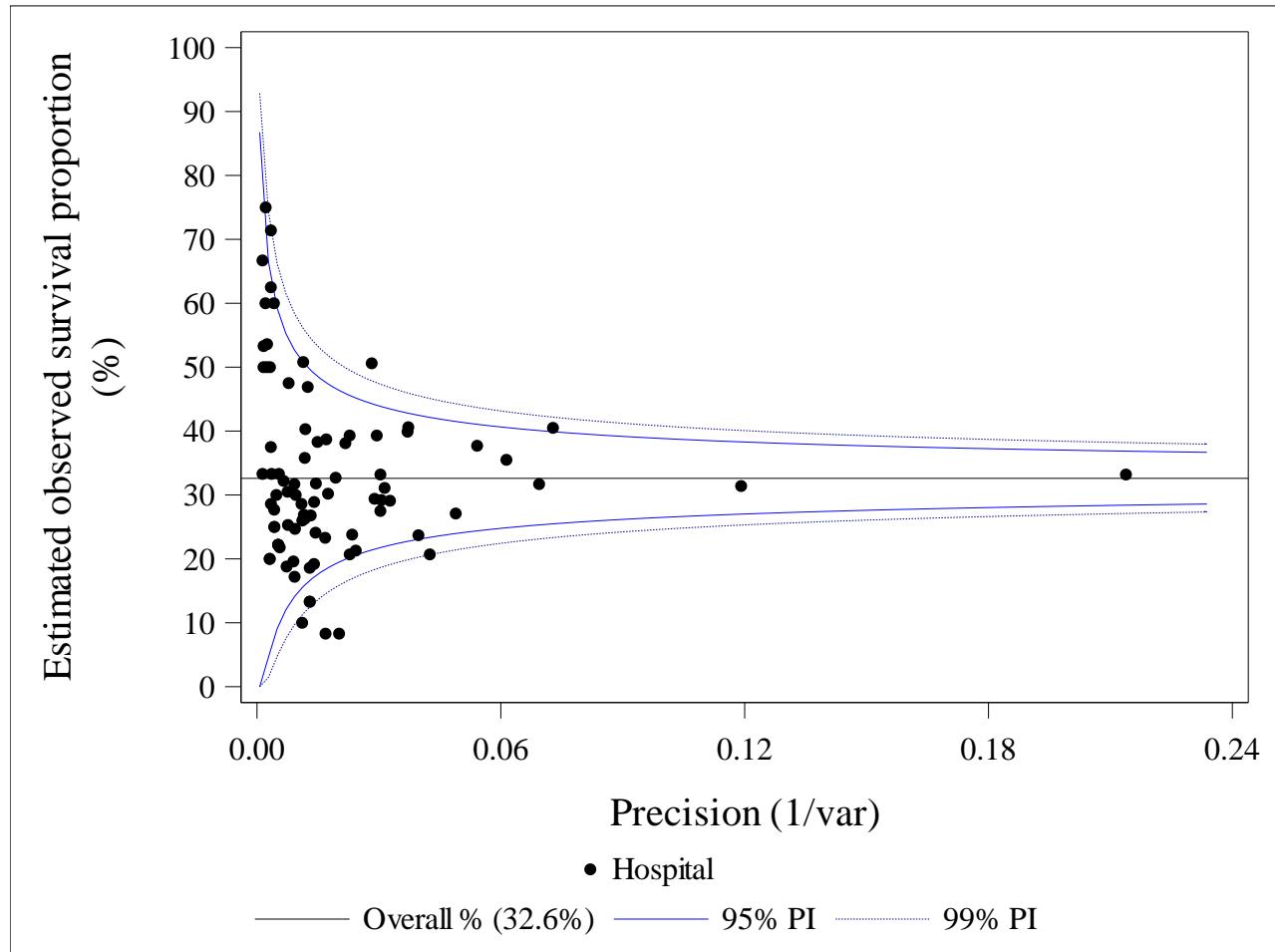
7 centres are not shown on the funnel plot as there OS at 5 year is 0 or 100% and their precision does not exist.

6.3. (Peri-)pancreatic cancer, observed survival adjusted for patient case mix

Figure 9. (Peri-)pancreatic cancer, Hazard Ratio for all-cause mortality, adjusted for patient case mix.
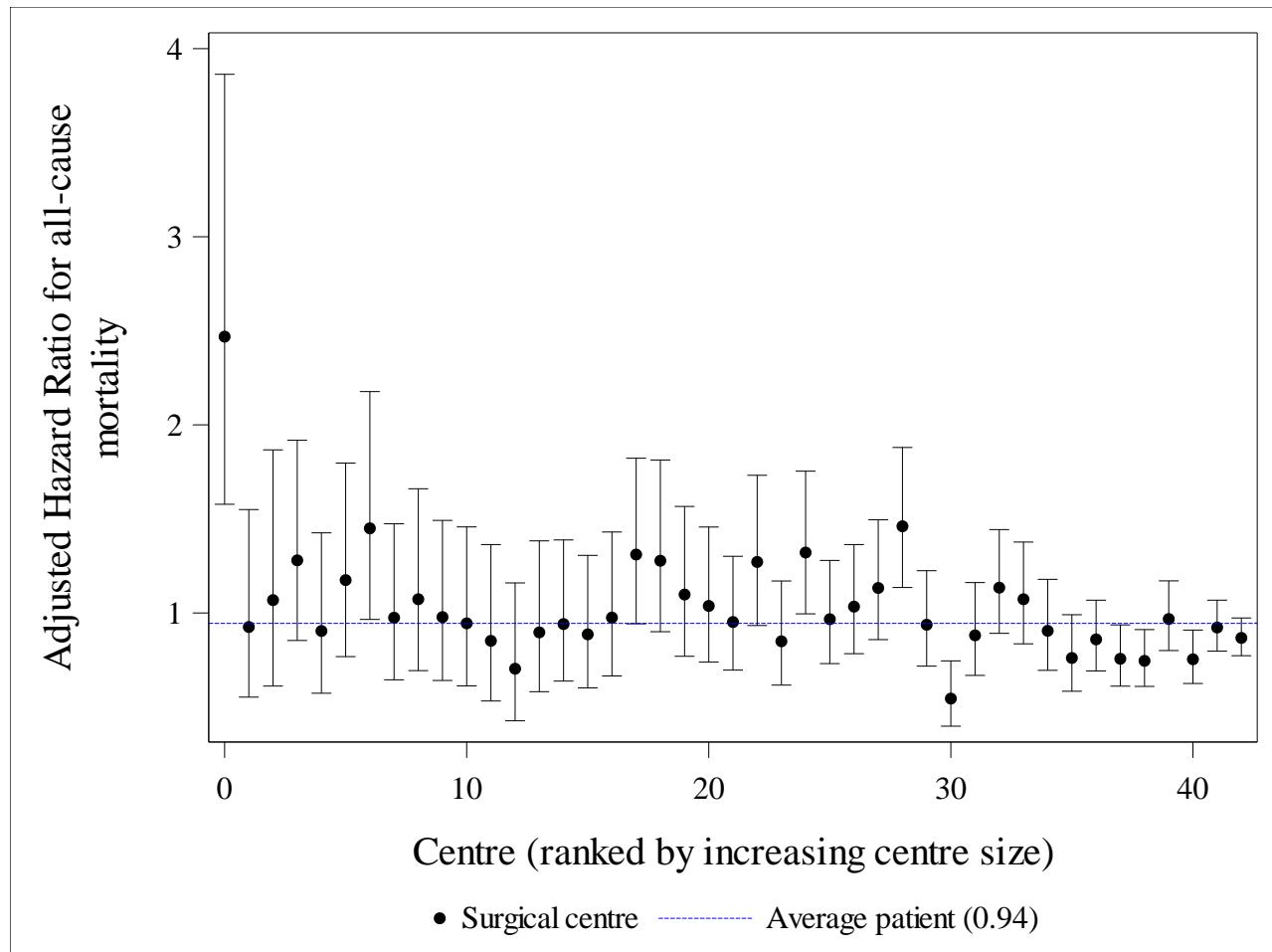
Centres with at least 25 retained patients are shown on the forest plot.

Expected: adjustment for the years / period 2008-2016

7.(Peri-)pancreatic cancer, Unadjusted relative survival

Table 8. (Peri-)pancreatic cancer, unadjusted relative survival proportions.

		Unadjusted relative survival, %					
		1 year		3 year		5 year	
varblname	Frequency Count	estimate	95% CI	estimate	95% CI	estimate	95% CI
Overall	4236	74.5	[73.2, 75.9]	45.2	[43.6, 46.9]	36.3	[34.6, 38.1]
Gender							
male	2288	74.5	[72.6, 76.4]	45.2	[42.9, 47.4]	36.9	[34.5, 39.3]
females	1948	74.6	[72.5, 76.5]	45.3	[42.9, 47.7]	35.7	[33.2, 38.3]
Age							
<=59	1144	84.2	[81.9, 86.2]	56.7	[53.6, 59.6]	46.9	[43.6, 50.1]
60-74	2108	74.2	[72.2, 76.1]	42.8	[40.5, 45.0]	33.4	[31.0, 35.8]
75+	984	63.5	[60.2, 66.7]	36.4	[32.9, 40.0]	29.6	[25.8, 33.7]
Combined stage							
I/is	842	91.0	[88.7, 93.0]	79.2	[75.8, 82.3]	72.5	[68.4, 76.3]
II	2486	70.8	[68.9, 72.7]	35.0	[33.0, 37.1]	24.7	[22.7, 26.8]
III	312	63.4	[57.6, 68.7]	28.2	[22.8, 33.9]	20.8	[15.5, 26.8]
IV	241	59.0	[52.4, 65.1]	26.1	[20.4, 32.2]	15.6	[10.7, 21.4]
NA	245	77.7	[71.7, 82.6]	51.4	[44.4, 58.2]	40.3	[32.5, 48.2]
X	110	90.6	[83.0, 95.3]	88.1	[79.2, 94.2]	90.5	[81.0, 97.2]
Neuro-endocrine							
no	3680	71.6	[70.1, 73.1]	38.5	[36.8, 40.2]	28.4	[26.6, 30.2]
yes	556	93.7	[91.1, 95.7]	89.5	[86.1, 92.3]	88.1	[84.1, 91.6]
WHO - Performance Status							
0 – Asymptomatic	638	81.4	[78.0, 84.4]	52.6	[48.3, 56.8]	43.9	[39.2, 48.5]
1 – Symptomatic but completely ambulatory	2458	73.7	[71.8, 75.4]	43.3	[41.1, 45.4]	33.6	[31.3, 35.8]
2 – Symptomatic, <50% in bed during the day	195	65.8	[58.5, 72.3]	30.8	[24.0, 38.0]	18.3	[11.7, 26.3]
3 – Symptomatic, >50% in bed, but not bedbound	28	47.8	[28.4, 65.2]	23.3	[9.2, 41.6]	26.0	[10.3, 46.4]
4 – Bedbound	18	85.5	[58.3, 96.8]	69.4	[39.7, 88.7]		
Missing	899	74.6	[71.5, 77.4]	48.7	[45.0, 52.2]	41.8	[38.0, 45.6]
Topography							
C170	198	81.7	[75.3, 86.8]	66.2	[58.3, 73.2]	57.5	[48.5, 65.8]
C240	279	76.7	[71.0, 81.5]	45.1	[38.6, 51.4]	35.2	[28.4, 42.3]
C241	450	86.5	[82.8, 89.6]	63.1	[57.7, 68.0]	54.3	[48.3, 60.1]
C250	1756	67.7	[65.4, 69.9]	32.3	[29.9, 34.7]	20.6	[18.3, 23.0]
C251	225	75.1	[68.7, 80.5]	43.4	[36.3, 50.4]	41.4	[33.9, 48.8]
C252	446	81.4	[77.3, 85.0]	62.9	[57.7, 67.8]	57.8	[52.0, 63.3]

	Frequency	Unadjusted relative survival, %					
		1 year		3 year		5 year	
varblname	Count	estimate	95% CI	estimate	95% CI	estimate	95% CI
C253	53	82.9	[69.3, 91.4]	47.3	[32.6, 61.0]	39.9	[25.3, 54.8]
C254	47	94.5	[82.2, 98.8]	91.9	[78.2, 98.3]	85.9	[69.6, 95.3]
C257	33	86.0	[68.3, 94.7]	41.8	[24.1, 59.0]	37.9	[20.0, 56.3]
C258	9	90.9	[44.3, 100.6]	80.6	[33.5, 100.0]	82.9	[34.4, 102.9]
C259	740	73.8	[70.4, 77.0]	46.3	[42.4, 50.1]	39.0	[35.0, 43.1]
Diabetic							
no	3281	75.9	[74.4, 77.4]	47.2	[45.4, 49.1]	38.1	[36.1, 40.1]
yes	955	69.8	[66.7, 72.8]	38.1	[34.7, 41.5]	30.3	[26.7, 33.9]
Cardiovascular disease							
no	1977	79.4	[77.5, 81.2]	50.2	[47.8, 52.6]	41.4	[38.8, 43.9]
yes	2259	70.3	[68.2, 72.2]	40.7	[38.5, 43.0]	31.8	[29.4, 34.2]
Respiratory disease							
no	4007	74.9	[73.5, 76.3]	45.5	[43.8, 47.2]	36.7	[34.9, 38.5]
yes	229	68.0	[61.4, 73.9]	39.9	[32.9, 46.9]	29.5	[22.4, 37.1]
Previous number of hospitalisations							
none	2539	75.3	[73.5, 77.0]	44.3	[42.2, 46.4]	34.5	[32.3, 36.7]
1 hosp	907	75.4	[72.3, 78.2]	47.2	[43.6, 50.7]	38.1	[34.3, 41.9]
2 hosp	424	74.8	[70.2, 78.9]	48.0	[42.7, 53.2]	42.0	[36.3, 47.7]
>2 hosp	366	67.3	[62.1, 72.0]	43.7	[38.1, 49.2]	38.7	[32.8, 44.7]
Previous inpatient bed days							
none	2539	75.3	[73.5, 77.0]	44.3	[42.2, 46.4]	34.5	[32.3, 36.7]
1-5 days	958	76.9	[74.0, 79.6]	49.4	[45.9, 52.8]	40.0	[36.2, 43.9]
6-15 days	467	73.2	[68.8, 77.2]	45.8	[40.8, 50.7]	40.3	[35.0, 45.6]
>15 days	272	61.9	[55.7, 67.6]	38.4	[32.2, 44.7]	33.7	[27.3, 40.3]
Region							
Brussels-Capital region	280	72.4	[66.5, 77.5]	40.5	[34.2, 46.8]	30.8	[24.4, 37.5]
Flemish Region	2657	74.2	[72.4, 75.9]	45.3	[43.2, 47.3]	36.5	[34.4, 38.8]
Walloon Region	1299	75.7	[73.1, 78.0]	46.1	[43.1, 49.1]	37.1	[33.9, 40.2]
Prestation year							
2008	380	72.9	[68.0, 77.3]	40.1	[34.9, 45.2]	32.3	[27.3, 37.5]
2009	447	75.9	[71.5, 79.8]	44.3	[39.4, 49.2]	36.2	[31.4, 41.1]
2010	415	70.7	[65.9, 75.0]	44.7	[39.6, 49.7]	33.8	[29.0, 38.8]
2011	502	72.2	[67.9, 76.1]	41.9	[37.3, 46.5]	32.7	[28.2, 37.2]
2012	448	72.7	[68.2, 76.7]	45.1	[40.2, 49.9]	36.7	[31.9, 41.5]
2013	456	74.8	[70.4, 78.7]	47.9	[42.9, 52.7]	39.6	[34.6, 44.7]
2014	493	77.1	[72.9, 80.7]	46.2	[41.5, 50.8]		
2015	507	75.2	[71.0, 78.9]	44.8	[39.9, 49.6]		
2016	588	77.8	[74.1, 81.1]				

| varblname | Frequency Count | Unadjusted relative survival, % | | | | | |
| | | 1 year | | 3 year | | 5 year | |
		estimate	95% CI	estimate	95% CI	estimate	95% CI
Surgical volume							
low	1190	70.9	[68.1, 73.5]	42.9	[39.8, 45.9]	34.8	[31.6, 38.0]
medium	1284	73.1	[70.5, 75.5]	44.3	[41.4, 47.3]	36.3	[33.2, 39.5]
high	1762	78.1	[76.0, 80.0]	47.4	[44.9, 50.0]	37.4	[34.7, 40.1]

7 patients were censored or died at the day of surgery and were therefore omited for the Observed Survival analysis