PROCARE
PROJECT ON CANCER OF THE RECTUM

Belgian Cancer Registry

PROCARE
FINAL FEEDBACK

General report
2006-2014

Version 2.1
08/12/2015

Part 1. PROCARE indicators 2006-2014

The results presented in this section are based on all data registered in the PROCARE database in the period 2006-2014. Note that these results cannot be generalised to the Belgian population of rectal cancer patients, due to the selection bias in the PROCARE dataset [Jegou D et al., "Completeness and registration bias in PROCARE, a Belgian multidisciplinary project on cancer of the rectum with participation on a voluntary basis", Eur J Cancer (2014) 51, 1099-108]]. The completeness for PROCARE is given in Part 2 of this feedback report.

1.1. Demographic Data

Table 1. Number of patients registered in PROCARE, patient characteristics and summary numbers of their distribution over the PROCARE centres.

Characteristic	PROCARE Number (%) Mean {sd} Median [P25-P75]	Distribution over PROCARE centres Median [P25-P75]
Number of patients registered	7639	49.5 [15.5-121.5]
Gender		
Males	4,787 (62.67)	61.0 [57.2-67.1]
Females	2,852 (37.33)	39.0 [32.9-42.8]
Age		
Mean age {sd}	67.3 {11.8}	67.6 [65.8-69.4]
Median age	68.0 [60.0-76.0]	68.5 [66.5-70.0]

1.2. Diagnosis and staging

Table 2. Frequency and percentage of diagnosis and staging QCI or related indicators and summary numbers of their distribution over the PROCARE centres.

	PROCARE	Distribution over PROCARE centres
Indicator	**Number (%)**	**Median [P25-P75]**
QCI: Documented distance		
High (>10 - ≤15 cm)	1,154 (17.67)	16.2 [8.1-24.1]
Mid (5 cm - ≤10 cm)	2,764 (42.32)	40.0 [34.4-50.0]
Low ≤5 cm	2,613 (40.01)	40.0 [35.7-50.0]
Missing	1,108 (14.50)	8.0 [1.8-17.2]
QCI: Complete large bowel imaging	5,988 (96.60)	99.0 [95.7-100.0]
QCI: CT abdomen and CT or RX thorax	3,805 (82.27)	88.7 [73.3-96.2]
Use of imaging		
Use of any imaging (CT/MRI/TRUS)	4,552 (85.64)	92.1 [72.8-98.1]
Use of TRUS (any stage)	2,359 (44.38)	41.3 [18.4-65.4]
Use of CT pelvis (any stage)	4,048 (76.16)	79.8 [58.5-93.5]
Use of MRI (any stage)	3,121 (58.72)	55.7 [33.3-73.8]
Use of TRUS in cT1/cT2	432 (46.40)	47.4 [14.3-66.7]
Use of MRI in cStage II-III	2,380 (79.92)	88.9 [71.4-97.0]
QCI: Locoregional staging by TRUS + CT pelvis and/or MRI pelvis	2,255 (42.43)	35.5 [11.2-59.1]
QCI: cCRM reported in cStage II-III if radical resection	1,511 (35.21)	14.8 [0.0-41.8]
Tumour clinical stage		
cStage 0	28 (0.43)	0.0 [0.0-0.0]
cStage I	836 (12.78)	11.3 [6.1-19.4]
cStage II	957 (14.64)	16.7 [9.9-22.2]
cStage III	3,518 (53.80)	51.5 [42.4-62.4]
cStage IV	935 (14.30)	12.5 [6.5-18.6]
cStage X	265 (4.05)	0.7 [0.0-5.3]
Missing	1,100 (14.40)	6.5 [0.0-19.8]
QCI: CEA before any treatment	6,067 (79.42)	87.3 [73.2-95.6]

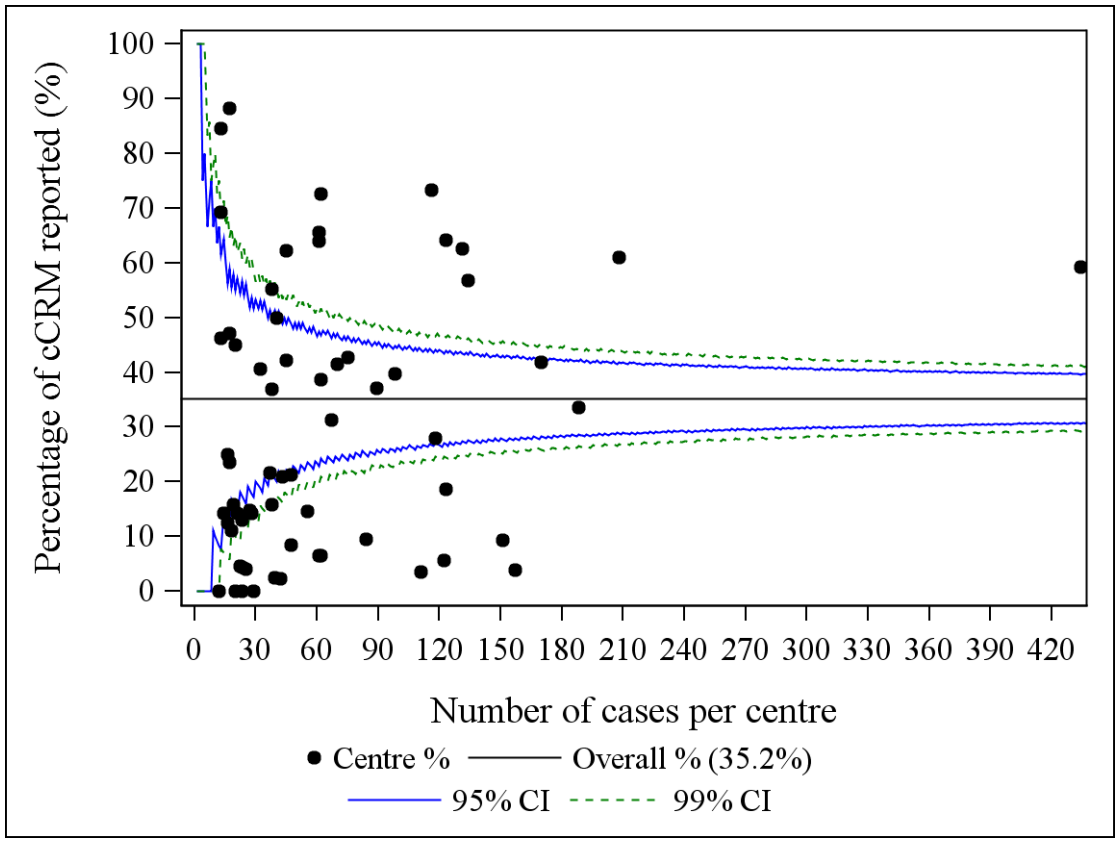

Figure 1. Funnel plot of cCRM reported in clinical stage II-III if radical resection.

1.3. Time to first treatment

Table 3. Time to first treatment in days and its distribution over the PROCARE centres.

Indicator	PROCARE Number (%) Median [P25-P75]	Distribution over PROCARE centres Median [P25-P75]
Missing date of biopsy or first consultation	957 (12.53)	3.0 [0.0-13.0]
Global (days)	29.0 [20.0-42.0]	30.0 [25.0-38.0]
First treatment surgery (days)	26.0 [15.0-43.0]	28.0 [20.0-38.0]
First treatment (C)RT (days)	27.0 [18.0-39.0]	30.5 [24.0-38.0]
First treatment palliative C(R)T (days)	30.0 [21.0-43.0]	30.0 [23.5-43.0]

1.4. Neoadjuvant treatment

Table 4. Frequency and percentage of neoadjuvant treatment QCI or related indicators and summary numbers of their distribution over the PROCARE centres.

Indicator	PROCARE Number (%)	Distribution over PROCARE centres Median [P25-P75]
QCI: Neoadjuvant treatment (C)RT for cStage II-III with radical resection	3,424 (79.78)	82.1 [63.8-90.1]
High tumour level (>10 -≤15 cm)	333 (52.44)	50.0 [20.0-77.3]
Mid tumour level (>5 -≤10 cm)	1,367 (82.00)	82.1 [71.4-100.0]
Low tumour level (≤5 cm)	1,612 (87.51)	90.0 [76.5-100.0]
QCI: Long course (C)RT without interruption for cStage II-III	2,505 (98.16)	100.0 [98.4-100.0]
Long course (C)RT if cCRM ≤2 mm	679 (81.32)	80.0 [57.1-100.0]
Neoadjuvant treatment (C)RT in cStage I with radical resection	110 (14.95)	0.0 [0.0-16.3]
High tumour level (>10 -≤15 cm)	14 (7.82)	0.0 [0.0-0.0]
Mid tumour level (>5 -≤10 cm)	25 (9.62)	0.0 [0.0-0.0]
Low tumour level (≤5 cm)	67 (25.48)	0.0 [0.0-37.5]
QCI: cStage II-III treated with 5FU that received continuous FU	1,438 (94.54)	100.0 [97.1-100.0]
QCI: Surgery 4-12 weeks after long course (C)RT for cStage II-III	2,406 (97.49)	100.0 [97.6-100.0]
Missing date first irradiation	924 (20.21)	12.5 [3.2-33.3]
Missing date last irradiation	921 (20.14)	11.6 [2.9-33.3]
Missing number of fractions	846 (18.50)	9.8 [2.6-30.0]
Missing total dose	885 (19.36)	10.8 [3.3-30.0]
Missing radiation compliance	911 (19.93)	10.2 [2.6-31.7]
Missing concomitant chemotherapy	145 (3.17)	1.3 [0.0-5.1]

1.5. Surgery

Table 5. Frequency and percentage of surgery QCI or related indicators and summary numbers of their distribution over the PROCARE centres.

Indicator	PROCARE Number (%) Median [P25-P75]	Distribution over PROCARE centres Median [P25-P75]
Mode of surgery		
Elective/Scheduled	6,199 (98.82)	100.0 [97.9-100.0]
Urgent/Emergency	74 (1.18)	0.0 [0.0-2.1]
Missing	615 (8.93)	2.4 [0.0-6.7]
Resection approach if radical		
Laparotomy	3,835 (61.69)	71.0 [37.5-95.6]
Laparoscopy	2,091 (33.63)	21.9 [2.2-54.2]
Converted laparoscopy	291 (4.68)	0.9 [0.0-6.5]
Missing	537 (7.95)	0.0 [0.0-6.5]
Reconstruction approach if radical		
Laparotomy	3,936 (64.02)	72.4 [40.0-95.6]
Laparoscopy	2,003 (32.58)	21.9 [1.5-53.8]
Converted laparoscopy	209 (3.40)	0.0 [0.0-4.4]
Missing	606 (8.97)	1.6 [0.0-10.0]
QCI: R-status after radical resection		
R0	4,400 (73.04)	73.9 [63.2-78.8]
R1	854 (14.18)	12.6 [5.6-19.2]
R2	770 (12.78)	11.2 [4.5-18.1]
Missing	730 (10.81)	9.1 [2.8-25.0]
Rectal perforation		
Rectal perforation	383 (5.74)	5.1 [0.0-7.8]
Missing	622 (9.21)	0.7 [0.0-9.1]
Distal margin involvement if radical resection for low tumour level	25 (2.40)	0.0 [0.0-0.0]
(y)pCRM positivity if radical resection	698 (16.61)	15.3 [7.7-22.2]
High tumour level (>10 - ≤15 cm)	102 (15.53)	11.1 [0.0-20.0]
Mid tumour level (>5 - ≤10 cm)	235 (14.49)	12.1 [0.0-19.4]
Low tumour level (≤5 cm)	319 (18.33)	16.0 [0.0-25.0]
Missing (y)pCRM	1,633 (27.98)	32.9 [20.7-53.4]
Technique of resection		
PME	1,035 (15.78)	13.8 [5.3-24.0]
TME	5,476 (83.46)	84.4 [73.1-94.7]
Conventional	50 (0.76)	0.0 [0.0-0.0]
Missing	193 (2.86)	0.0 [0.0-2.0]
Type of reconstruction		
Local excision/TEM	95 (1.56)	0.0 [0.0-1.1]
QCI:APER + Hartmann	1,416 (23.22)	24.6 [18.0-33.3]
High tumour level (>10 - ≤15 cm)	44 (4.04)	0.0 [0.0-4.8]

Indicator	PROCARE Number (%) Median [P25-P75]	Distribution over PROCARE centres Median [P25-P75]
Mid tumour level (>5 - ≤10 cm)	176 (7.23)	4.1 [0.0-10.8]
Low tumour level (≤5 cm)	1,196 (46.45)	52.6 [41.3-66.7]
SSO	4,579 (75.08)	72.8 [65.0-81.0]
High anterior resection + CRA	142 (2.33)	0.0 [0.0-2.6]
Low anterior resection + CRA	827 (13.56)	12.5 [3.4-23.3]
Restorative rectum resection (Global)	3,610 (59.19)	56.8 [42.9-66.7]
RRR + straight CAA	1,363 (22.35)	20.3 [8.3-40.4]
RRR + coloplasty	85 (1.39)	0.0 [0.0-0.8]
RRR + pouch	1,128 (18.49)	2.5 [0.0-15.4]
RRR + side-to-end CAA	1,034 (16.95)	8.7 [0.0-21.7]
Ileal pouch anal anastomosis	19 (0.31)	0.0 [0.0-0.0]
Missing	748 (11.09)	3.8 [0.0-11.1]
Distal anastomosis technique if SSO for low tumour level		
Stapled	841 (64.99)	92.4 [66.7-100.0]
Manual	453 (35.01)	7.6 [0.0-33.3]
Missing	33 (2.49)	0.0 [0.0-0.0]
Derivative stoma if PME + SSO + Reconstruction	216 (21.91)	16.7 [1.1-35.9]
Missing	3 (0.30)	0.0 [0.0-0.0]
Derivative stoma if TME + SSO + Reconstruction	2,481 (68.73)	76.6 [50.0-97.7]
Missing	17 (0.47)	0.0 [0.0-0.0]
QCI: Major leak after PME + SSO + reconstruction	49 (4.97)	0.0 [0.0-7.9]
QCI: Major leak after TME + SSO + reconstruction	195 (5.24)	2.3 [0.0-7.1]
With derivative stoma	84 (3.26)	0.0 [0.0-2.8]
Without derivative stoma	111 (9.68)	6.1 [0.0-15.5]
Derivative stoma 1 year after SSO	110 (19.06)	20.0 [0.0-33.3]
QCI: 30 day mortality if radical resection	95 (1.41)	0.5 [0.0-2.0]
QCI: 90 day mortality if radical resection	200 (2.96)	2.3 [0.0-4.9]
QCI: Major surgical morbidity after radical resection	496 (7.83)	6.3 [3.0-9.7]
ASA score		
1	1,376 (24.12)	25.0 [12.1-40.0]
2	3,056 (53.57)	53.0 [40.0-62.6]
3	1,214 (21.28)	20.0 [9.6-25.4]
>3	59 (1.03)	0.0 [0.0-1.2]
Missing	1,049 (15.53)	6.5 [0.0-27.1]
Length of hospital stay (days)	11.0 [8.0-16.0]	11.0 [9.8-13.8]
Missing date of discharge	651 (9.81)	3.8 [0.0-10.5]

1.6. Pathology

Table 6. Frequency and percentage of pathology QCI or related indicators and summary numbers of their distribution over the PROCARE centre.

	PROCARE	Distribution over PROCARE centres
Indicator	Number (%) Mean {sd}	Median [P25-P75]
QCI: Report on quality if TME		
Report on quality if TME (since 01/01/2007)	5,034 (92.64)	98.9 [89.3-100.0]
TME severely irregular	376 (11.06)	6.1 [0.0-12.6]
QCI: (y)pCRM reported in mm (if radical resection)	4,201 (77.00)	71.4 [50.0-83.9]
QCI: Distal margin involvement reported (after SSO + Hartmann for low RC)	1,089 (95.95)	100.0 [90.9-100.0]
Distal margin (in cm) mentioned (after SSO + Hartmann for low RC)	1,022 (84.39)	91.3 [70.7-100.0]
Mean distal tumour-free margin (in cm) at SSO or Hartmann		
High tumour level (>10 -≤15 cm)	4.1 {2.1}	4.0 [3.5-4.5]
Mid tumour level (>5 -≤10 cm)	2.9 {1.8}	2.8 [2.3-3.2]
Low tumour level (≤5 cm)	1.7 {1.2}	1.8 [1.4-2.0]
Missing	716 (16.12)	12.7 [4.3-31.7]
(y)pT categories if radical resection		
ypT0	605 (9.74)	8.1 [2.8-12.5]
ypTis	46 (0.74)	0.0 [0.0-0.2]
(y)pT1	531 (8.55)	7.1 [2.4-11.5]
(y)pT2	1,591 (25.62)	24.9 [20.0-30.5]
(y)pT3	3,012 (48.50)	49.5 [40.4-54.8]
(y)pT4	425 (6.84)	4.9 [0.0-9.6]
Missing/X	541 (8.01)	3.2 [0.0-14.6]
(y)pN categories if radical resection		
(y)pN0	4,010 (64.36)	63.3 [58.3-69.6]
(y)pN+	2,221 (35.64)	36.7 [30.4-41.7]
Missing/X	515 (7.63)	2.6 [0.0-14.2]
QCI: Median number of nodes examined		
No or short course neoadj RT	15.2 {9.4}	. [11.0-16.0]
Long course neoadj RT	11.4 {6.8}	11.0 [8.0-13.0]
Course type missing	12.0 {7.8}	10.0 [8.0-13.5]
QCI: Regression grade (Dworak) reported (after long course)	2,525 (81.79)	80.0 [54.9-90.8]
(y)pStage if radical resection		
ypStage 0	534 (8.51)	6.1 [0.0-11.1]
(y)pStage I	1,527 (24.34)	24.6 [17.2-30.8]
(y)pStage II	1,451 (23.13)	23.1 [15.4-28.6]
(y)pStage III	1,573 (25.08)	25.0 [16.3-30.5]
(y)pStage IV	804 (12.82)	10.9 [6.4-17.0]
(y)pStage X	384 (6.12)	0.0 [0.0-2.9]
Missing	481 (7.12)	2.8 [0.0-12.6]

1.7. Adjuvant treatment

Table 7. Frequency and percentage of adjuvant treatment QCI or related indicators and summary numbers of their distribution over the PROCARE centres.

Indicator	PROCARE Number (%)	Distribution over PROCARE centres Median [P25-P75]
QCI: Adjuvant chemo for (y)pStage III, R0, started within 3 months	400 (89.69)	100.0 [87.5-100.0]
Missing	705 (61.25)	82.9 [50.0-100.0]
QCI: Adjuvant chemo for (y)pStage II-III, R0, started within 3 months	647 (91.38)	100.0 [89.5-100.0]
Missing	1,569 (68.91)	82.9 [50.0-100.0]

1.8. Follow-up

Table 8. Frequency and percentage of follow-up forms registered among patients alive at the time of the follow-up and without previously reported local or distant recurrence (If no local or distant recurrence, forms should be continued until dead or a follow-up period of 60 months).

Indicator	PROCARE Number (%)	Distribution over PROCARE centres Median [P25-P75]
Number of patients for whom FU has been registered		
At 12 months	2,750 (44.42)	25.9 [6.1-57.1]
At 24 months	1,751 (34.39)	23.1 [2.1-45.5]
At 36 months	1,215 (29.83)	12.5 [0.0-33.3]
At 48 months	857 (26.71)	9.1 [0.0-26.8]
At 60 months	948 (38.92)	14.6 [0.0-28.6]

1.9. Accuracy of the clinical T and clinical N category, PROCARE results

Patients with radical resection that received no or short preoperative radiotherapy (number of fractions ≤5) are considered to evaluate the clinical accuracy. The cT value is taken from the final cTNM classification which is the summary of different diagnostic techniques. The applied exclusion criteria are:

- Patients with cT0, cTis, cTx, cNx, (y)pTx or (y)pNx were excluded,
- Patients for whom the interval length between the start of radiotherapy and the radical resection is missing or longer than 10 days.

1.9.1. Accuracy of clinical T category

Table 9. Accuracy of cT category if no or short preoperative radiotherapy (n=1952).

T category	ypT0	ypTis	(y)pT1	(y)pT2	(y)pT3	(y)pT4
cT1	4 (36.36)	2 (100.00)	79 (34.80)	33 (6.36)	20 (1.98)	2 (1.08)
cT2	1 (9.09)	0 (0.00)	110 (48.46)	305 (58.77)	235 (23.31)	13 (7.03)
cT3	6 (54.55)	0 (0.00)	38 (16.74)	174 (33.53)	706 (70.04)	100 (54.05)
cT4	0 (0.00)	0 (0.00)	0 (0.00)	7 (1.35)	47 (4.66)	70 (37.84)

Table 10. Accuracy of cT category if no or short preoperative radiotherapy (n=1952), binary version.

T category	<(y)pT3	≥(y)pT3	all
<cT3	534 (70.36)	270 (22.63)	804
≥(y)cT3	225 (29.64)	923 (77.37)	1148
Overall	759 (100.00)	1,193 (100.00)	1952

- 33.6% (270/804) was understaged
- 19.6% (225/1148) was overstaged
- Accuracy = 74.6% (1457/1952)

1.9.2. Accuracy of clinical N category

Table 11. Accuracy of cN category if no or short preoperative radiotherapy (n=1933).

N category	(y)pN0	(y)pN1	(y)pN2
cN0	765 (66.99)	245 (51.69)	73 (23.03)
cN1	288 (25.22)	178 (37.55)	151 (47.63)
cN2	89 (7.79)	51 (10.76)	93 (29.34)

Table 12. Accuracy of cN category if no or short preoperative radiotherapy (n=1933), binary version.

N category	(y)pN0	(y)pN+	all
cN0	765 (66.99)	318 (40.20)	1083
cN+	377 (33.01)	473 (59.80)	850
Overall	1,142 (100.00)	791 (100.00)	1933

- 29.4% (318/1083) was understaged
- 44.4% (377/850) was overstaged
- Accuracy = 64.0% (1238/1933)

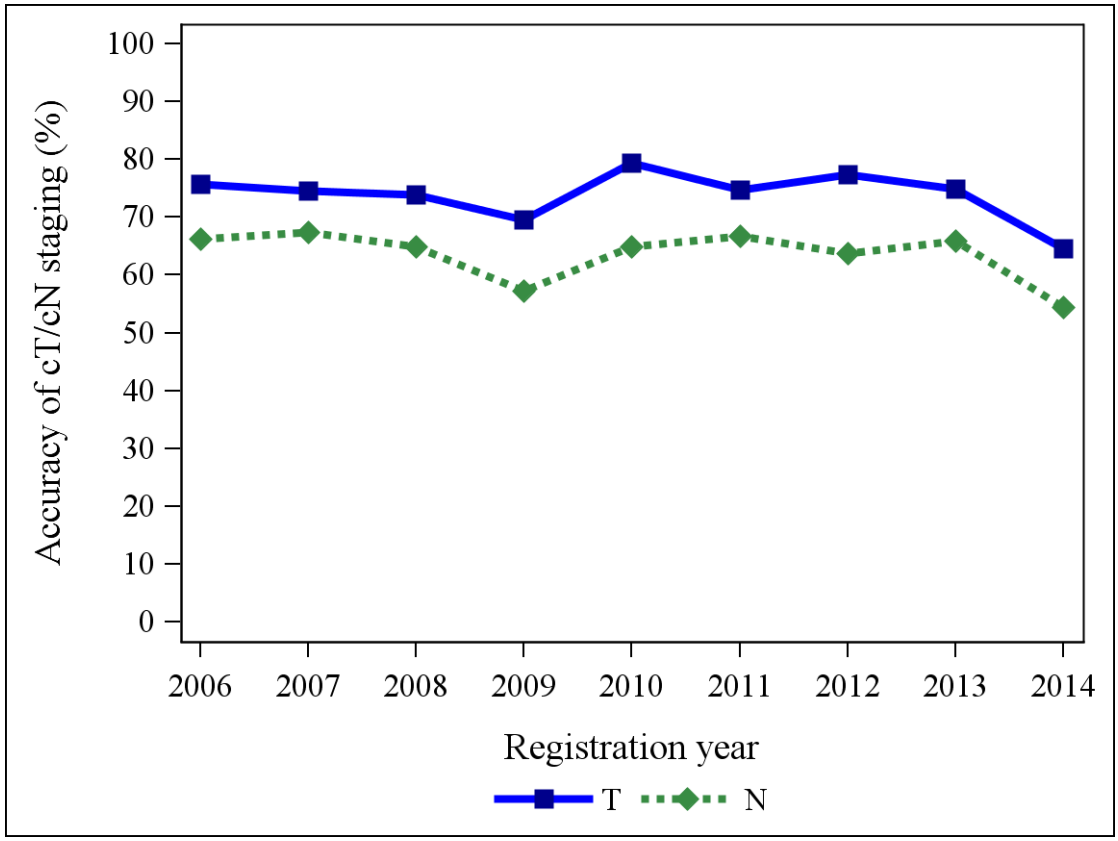

Figure 2. Accuracy of cT and cN staging by registration year.

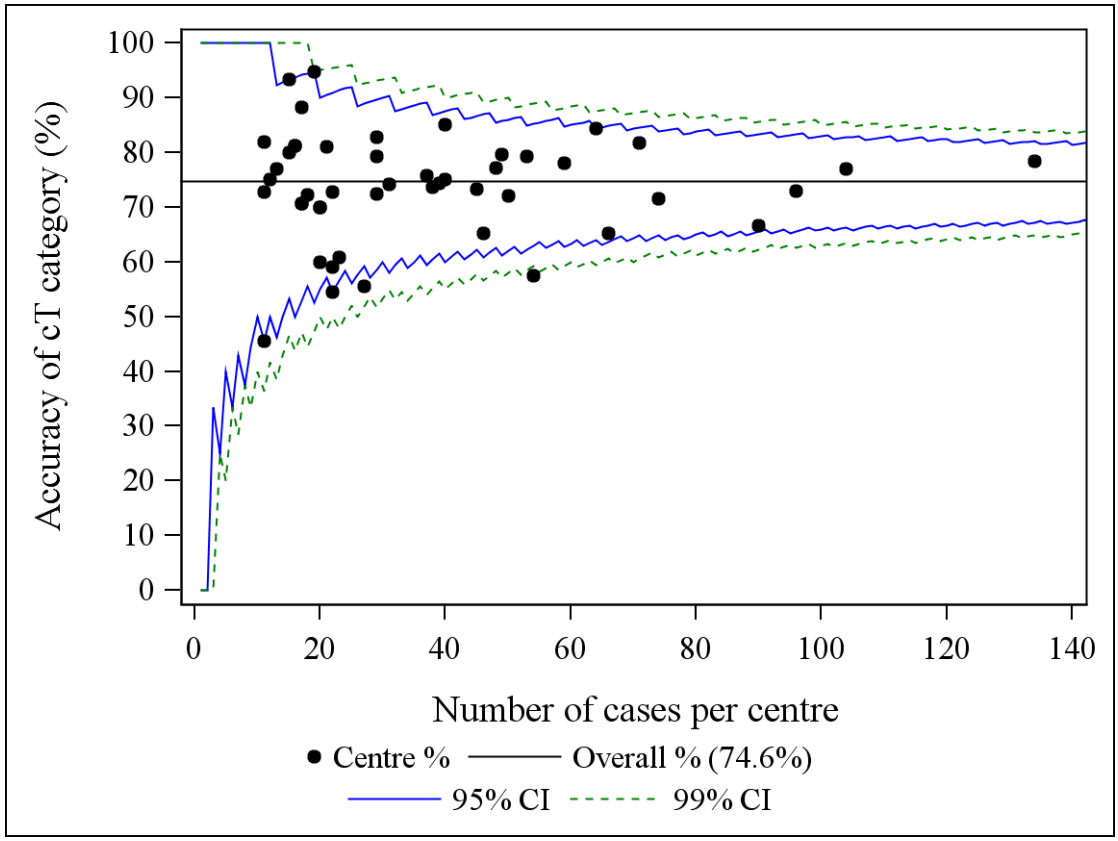

Figure 3. Funnel plot of cT accuracy staging, if no or short preoperative radiotherapy.

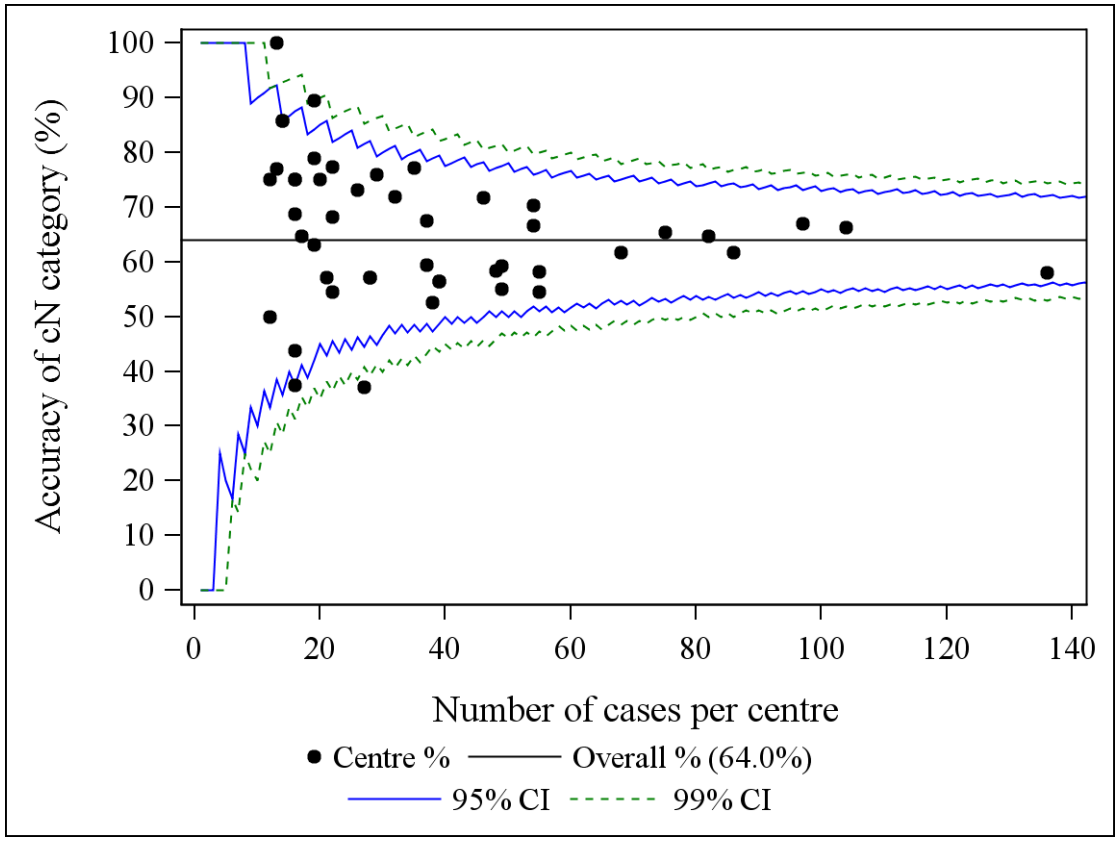

Figure 4. Funnel plot of cN accuracy staging, if no or short preoperative radiotherapy.

Part 2. PROCARE completeness 2006-2011

The completeness results presented in this section are based on the Belgian Cancer Registry (BCR) database coupled with data on diagnostic and treatment, delivered by the InterMutualistic Agency (IMA) for the incidence years 2006-2011. The crude participation rate is the registration rate over the full incidence period 2006-2011. The specific participation rate is the inclusion rate during the time period each team was "actively" registering, taking into account late entry or teams that have stopped to register. The methodology of this part is taken from the PROCARE completeness study [Jegou D et al., "Completeness and registration bias in PROCARE, a Belgian multidisciplinary project on cancer of the rectum with participation on a voluntary basis", Eur J Cancer (2014) 51, 1099-108].

2.1. Crude and specific participation rate for PROCARE

Table 13. Crude and specific participation rate for PROCARE.

	PROCARE centers (N=12859)		
Characteristic	**Number**	**Crude %**	**Specific %**
Total			
Participation	4,614	35.9	51.0
Gender			
Males	2,871	37.2	52.4
Females	1,743	34.0	48.8
Age group			
<60y	1,131	40.7	57.0
60y-69y	1,363	39.3	55.0
70y-79y	1,424	36.3	52.2
≥80y	696	25.9	37.4
Clinical stage			
I	502	42.2	54.4
II	673	41.8	59.0
III	1,995	52.9	68.6
IV	491	28.0	38.7
X	953	21.0	33.9
Vital status after 3 years			
Death	1,008	22.9	34.1
Alive	3,606	42.7	59.2
Treatment			
Neo_TT + Surgery + Adj_TT	1,963	54.3	71.8
Neo_TT + Surgery	983	47.3	67.1
Surgery + Adj_TT	598	29.1	45.5
Surgery only	806	31.1	46.1
Other TT	264	10.5	14.7

2.1. Variability of the specific participation rate by centre (2006-2011)

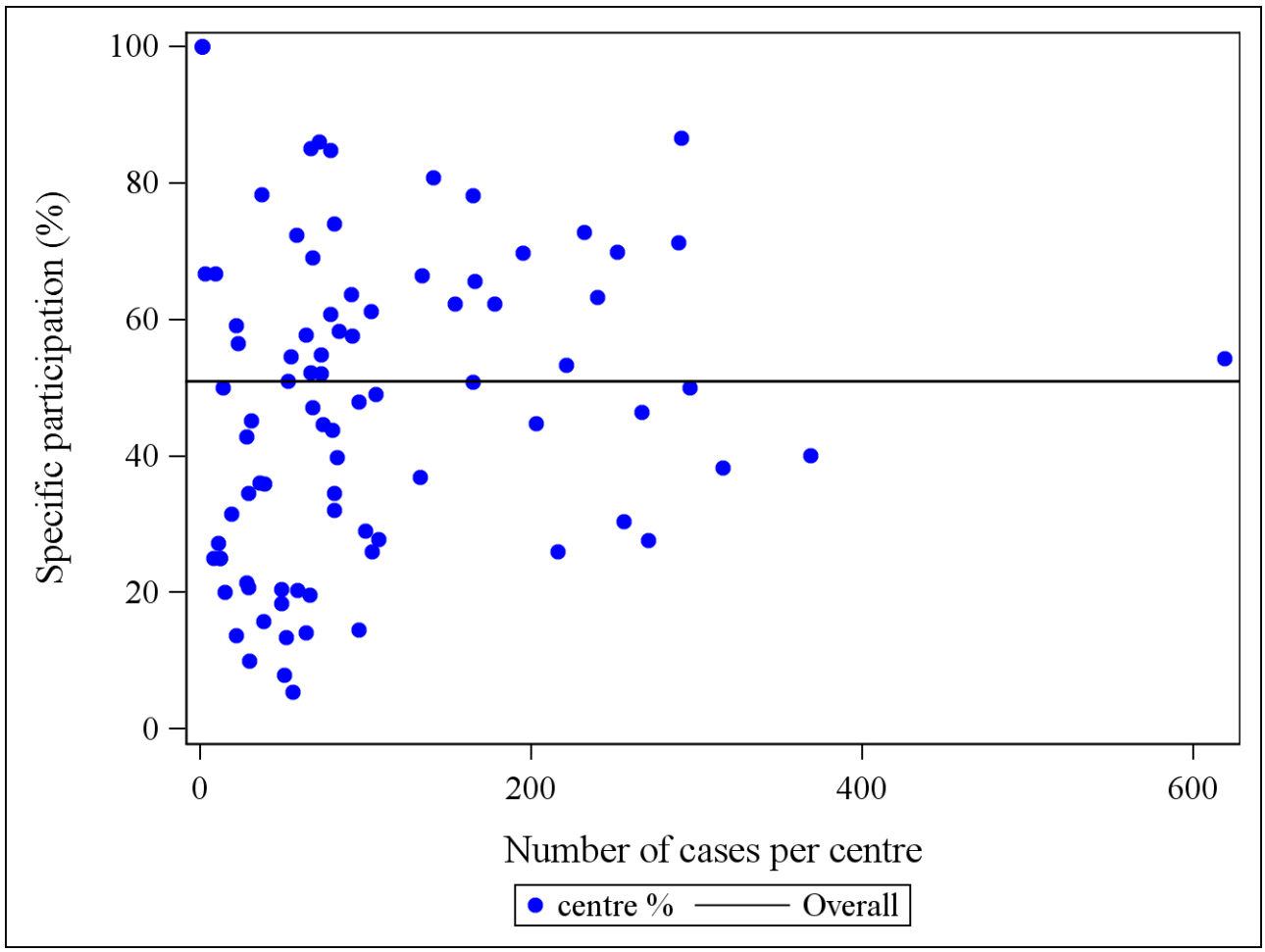

Figure 5. Specific participation rate by centre (2006-2011).

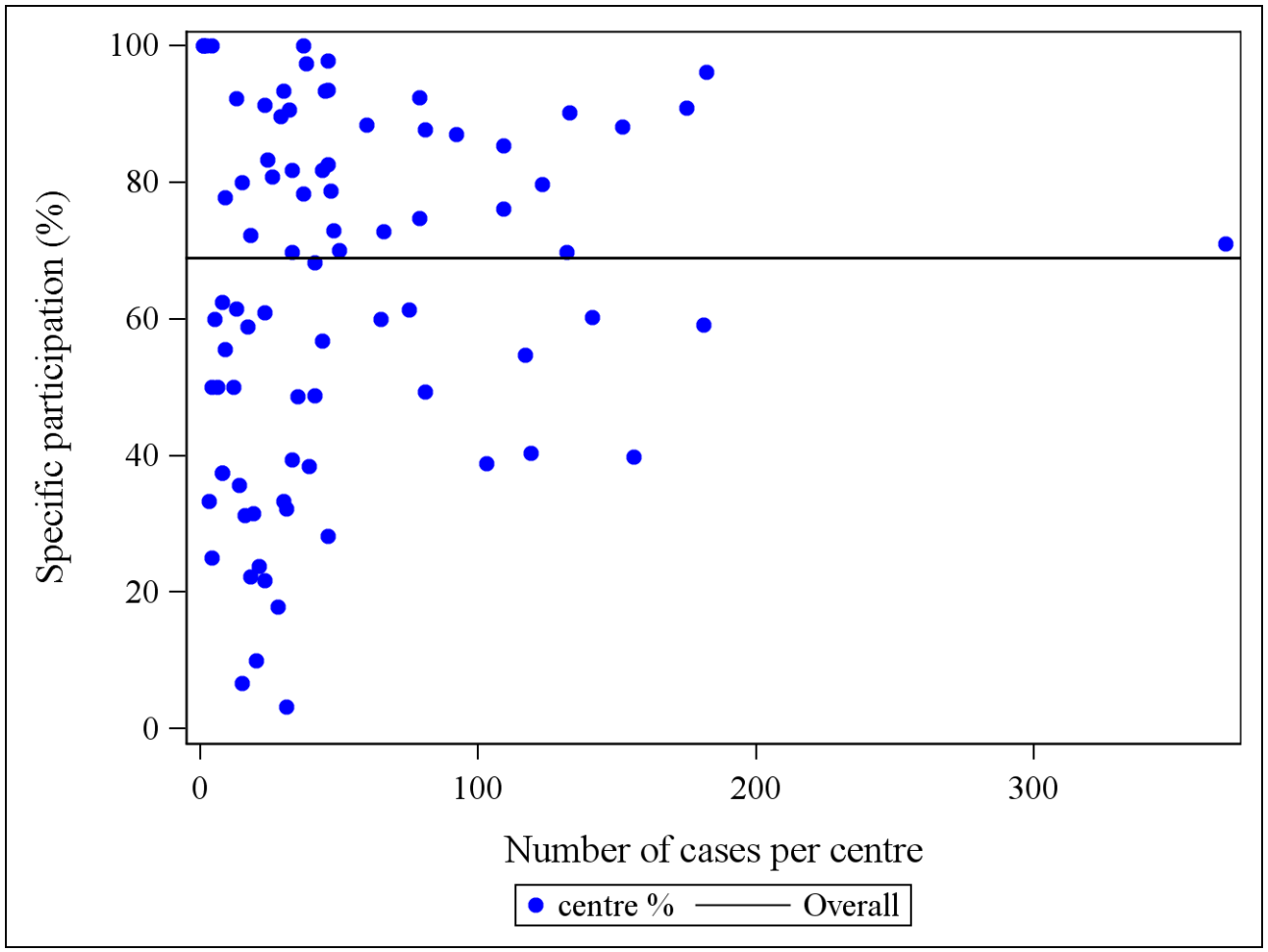

Figure 6. Specific participation rate by centre (2006-2011) for cStage I-III patients who underwent radical resection.

Part 3. Population based survival outcomes 2006-2011

The survival results presented in this section are based on the Belgian Cancer Registry (BCR) database for the incidence years 2006-2011 coupled with IMA data, and population based results are given.
The inclusion and exclusion criteria were matched as closely to PROCARE as possible: Belgian residents with an invasive rectum cancer diagnosis, excluding multiple primary rectum cancer tumours or synchronous invasive tumours (±90 days around the rectum cancer incidence date).

Remark that survival results given in the previous yearly PROCARE reports were only based on patients effectively registered into PROCARE and could not be generalised to the complete rectum cancer patient population on the national level.

Survival outcomes considered in this report are observed survival (OS), relative survival (RS) and postoperative 30-day and 90-day mortality. Survival results are given for the complete centre patient population as well as for the centre patient group that underwent radical resection.

3.1. All patients

3.1.1. Exploration patient and tumour characteristics

Compared to the completeness part, 12 patients in the reference population could not be taken into account for survival analysis as they were censored at incidence date and a such regarded as 'not at risk'.

Table 14. Frequency table of patient and tumour characteristics for Belgium, N=12,847.

Characteristic	Belgium (N=12,847) Number	%
Age group		
<60 year	2,776	21.61
60-74 year	5,348	41.63
75+ year	4,723	36.76
Gender		
Males	7,717	60.07
Females	5,130	39.93
Clinical stage		
0	16	0.12
I	1,179	9.18
II	1,607	12.51
III	3,769	29.34
IV	1,756	13.67
X	4,520	35.18
(y)Pathological stage		
0	345	2.69
is	41	0.32
I	2,899	22.57
II	2,681	20.87
III	3,274	25.48
IV	687	5.35
X	2,920	22.73
WHO score		
Missing	2,975	23.16
0	1,588	12.36
1	6,907	53.76
2	1,098	8.55
3+	279	2.17
Radical resection		
Yes, for (y)pStage 0,is,I-III	8,625	67.14
Yes, for (y)pStage IV	551	4.29
Yes, for (y)pStage X	785	6.11
No, for (y)pStage 0,is,I-III	615	4.79
No, for (y)pStage IV	136	1.06
No, for (y)pStage X	2,135	16.62

3.1.2. Unadjusted observed survival

Table 15. Unadjusted observed survival stratified by patient and tumour characteristics, all patients.

Unadjusted Observed Survival at 5 year			
	Belgium		
Characteristic	Number at risk	OS (%)	95% CI
Overall	12,847	54.6	[53.7, 55.5]
Age group			
<60 year	2,776	70.9	[69.1, 72.7]
60-74 year	5,348	63.7	[62.3, 65.0]
75+ year	4,723	34.7	[33.3, 36.2]
Gender			
Females	5,130	55.8	[54.5, 57.3]
Males	7,717	53.7	[52.6, 54.9]
Clinical stage			
0	16	NA (N<20)	
I	1,179	72.8	[70.1, 75.5]
II	1,607	61.6	[59.1, 64.1]
III	3,769	67.9	[66.3, 69.5]
IV	1,756	18.3	[16.5, 20.4]
X	4,520	50.1	[48.7, 51.7]
(y)Pathological stage			
0	345	88.5	[84.4, 91.6]
I	2,899	78.9	[77.3, 80.5]
II	2,681	65.7	[63.7, 67.6]
III	3,274	51.2	[49.4, 53.1]
IV	687	23.7	[20.5, 27.2]
X	2,920	27.0	[25.4, 28.7]
is	41	80.7	[60.1, 91.4]
WHO score			
0	1,588	68.6	[66.2, 71.0]
1	6,907	57.6	[56.4, 58.9]
2	1,098	44.4	[41.4, 47.4]
3+	279	19.0	[14.6, 24.0]
Missing	2,975	47.3	[45.5, 49.2]
Radical resection			
No, for (y)pStage 0,is,I-III	615	55.3	[51.1, 59.5]
No, for (y)pStage IV	136	8.5	[4.3, 14.6]
No, for (y)pStage X	2,135	12.7	[11.3, 14.2]
Yes, for (y)pStage 0,is,I-III	8,625	66.3	[65.3, 67.4]
Yes, for (y)pStage IV	551	27.4	[23.6, 31.5]
Yes, for (y)pStage X	785	65.8	[62.2, 69.2]

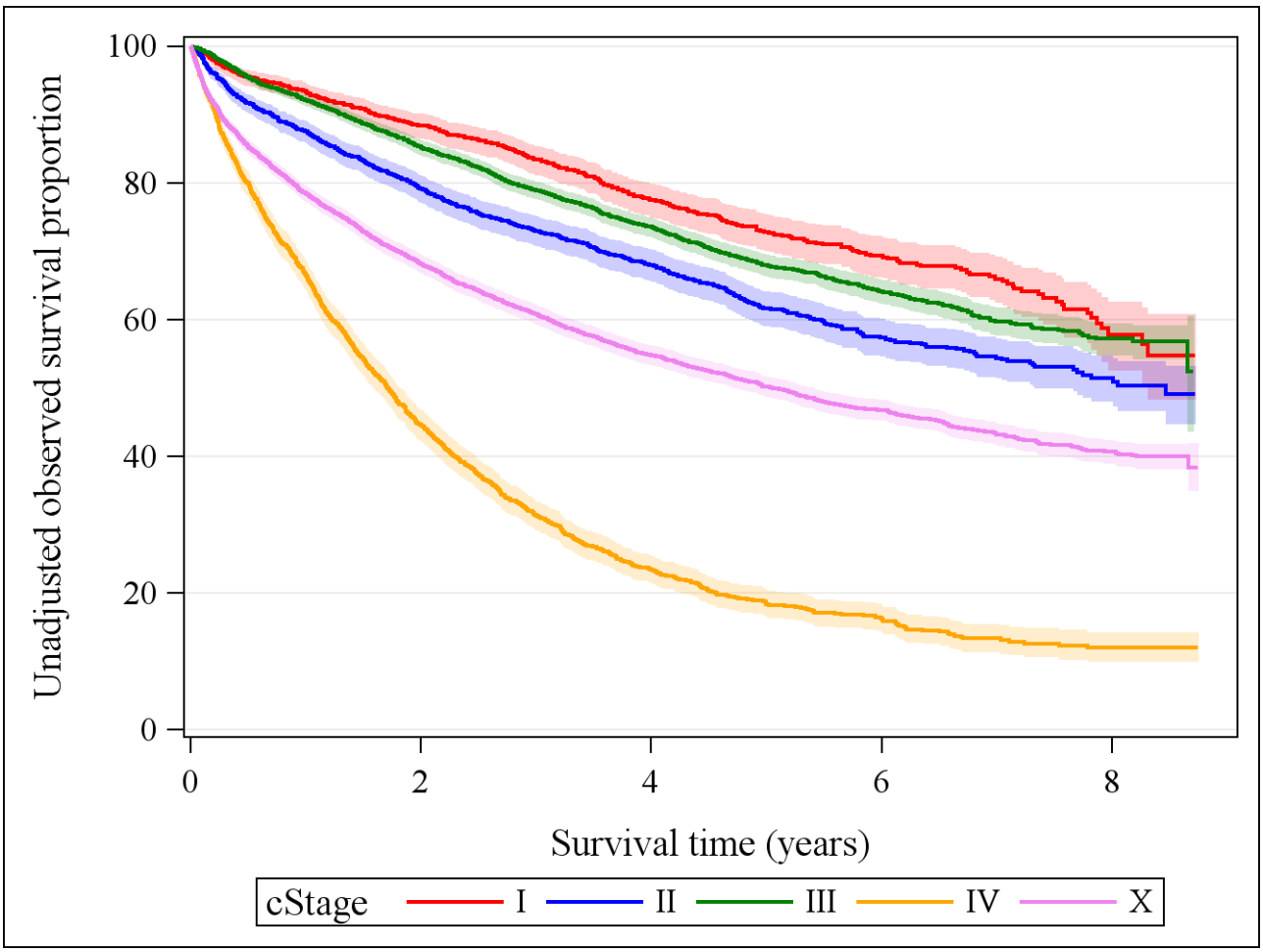

Figure 7. Kaplan-Meier plot of unadjusted observed survival stratified by clinical stage, Belgium 2006-2011, all patients.

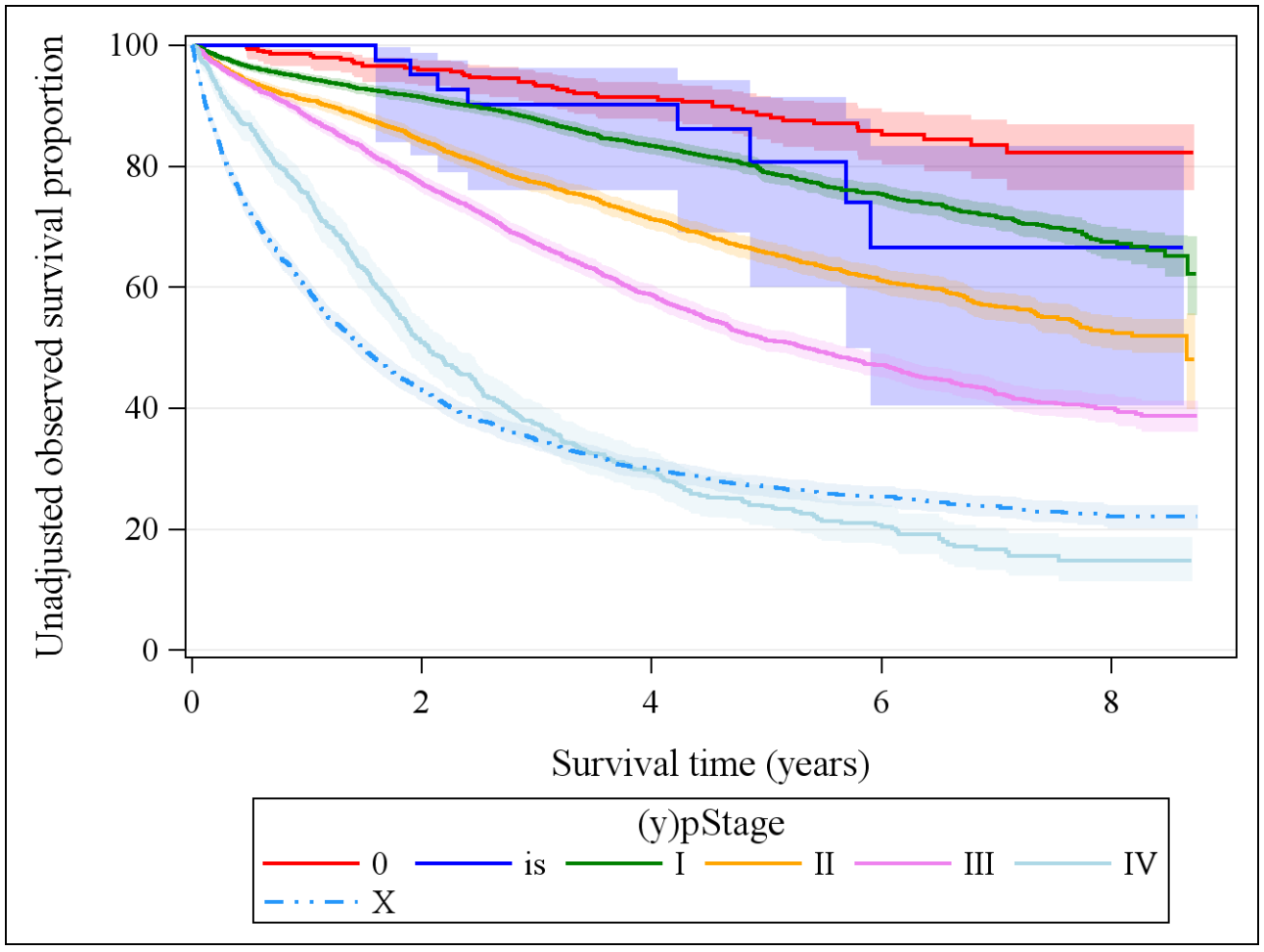

Figure 8. Kaplan-Meier plot of unadjusted observed survival stratified by pathological stage, Belgium 2006-2011, all patients.

3.1.3. Adjusted observed survival

Due to differences in patient case mix, the observed survival proportions between hospitals cannot directly be compared. In order to correct as much as possible for case mix, an adjustment analysis was performed, adjusting for gender, age, clinical stage, WHO score and having received a radical resection or not.
Results are displayed for centres with at least 50 eligible patients and a minimum follow-up of 5 year.

The forest plot below shows the estimated Hazard Ratio (HR) per hospital for a death event due to any cause. The reference HR is the one for the average patient. If the reference line cuts the confidence interval for an estimated adjusted HR, the observed survival in that hospital is not significantly different from the national level. If the confidence interval is entirely below/above the reference line, survival in that hospital is significantly higher/lower compared to the national level.

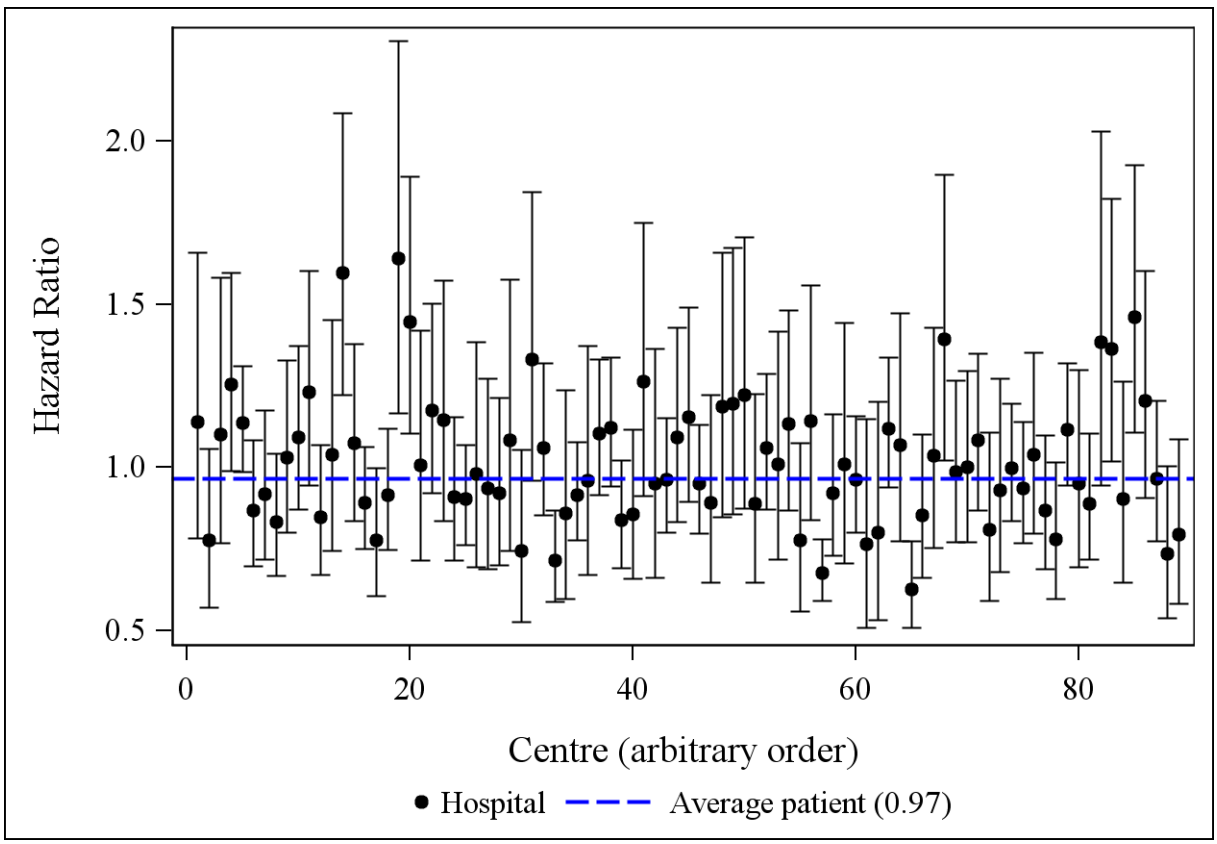

Figure 9. Forest plot of adjusted hazard ratio for all cause mortality with 95% confidence limit, all patients.

3.1.4. Unadjusted relative survival

Table 16. Unadjusted relative survival stratified by patient and tumour characteristics, all patients.

Unadjusted Relative Survival at 5 year			
		Belgium	
Characteristic	Number at risk	RS (%)	95% CI
Overall	12,847	65.4	[64.4, 66.5]
Age group			
<60 year	2,776	73.0	[71.1, 74.8]
60-74 year	5,348	70.7	[69.3, 72.3]
75+ year	4,723	54.1	[51.9, 56.4]
Gender			
Males	7,717	65.1	[63.7, 66.6]
Females	5,130	65.7	[64.1, 67.5]
Clinical stage			
0	16	NA (N<50)	
I	1,179	89.0	[85.6, 92.2]
II	1,607	74.9	[71.8, 77.9]
III	3,769	78.7	[76.8, 80.6]
IV	1,756	20.8	[18.7, 23.1]
X	4,520	62.2	[60.3, 64.1]
(y)Pathological stage			
0	345	99.2	[94.6, 102.8]
is	41	NA (N<50)	
I	2,899	94.6	[92.7, 96.5]
II	2,681	79.4	[77.1, 81.7]
III	3,274	60.6	[58.4, 62.8]
IV	687	26.8	[23.1, 30.7]
X	2,920	33.3	[31.3, 35.4]
WHO score			
Missing	2,975	58.0	[55.7, 60.3]
0	1,588	79.1	[76.2, 81.8]
1	6,907	68.6	[67.2, 70.1]
2	1,098	55.2	[51.6, 59.0]
3+	279	25.0	[19.2, 31.6]
Radical resection			
Yes, for (y)pStage 0,is,I-III	8,625	78.9	[77.7, 80.2]
Yes, for (y)pStage IV	551	30.9	[26.6, 35.5]
Yes, for (y)pStage X	785	76.5	[72.3, 80.5]
No, for (y)pStage 0,is,I-III	615	69.5	[64.1, 74.7]
No, for (y)pStage IV	136	9.8	[5.1, 16.5]
No, for (y)pStage X	2,135	16.4	[14.6, 18.4]

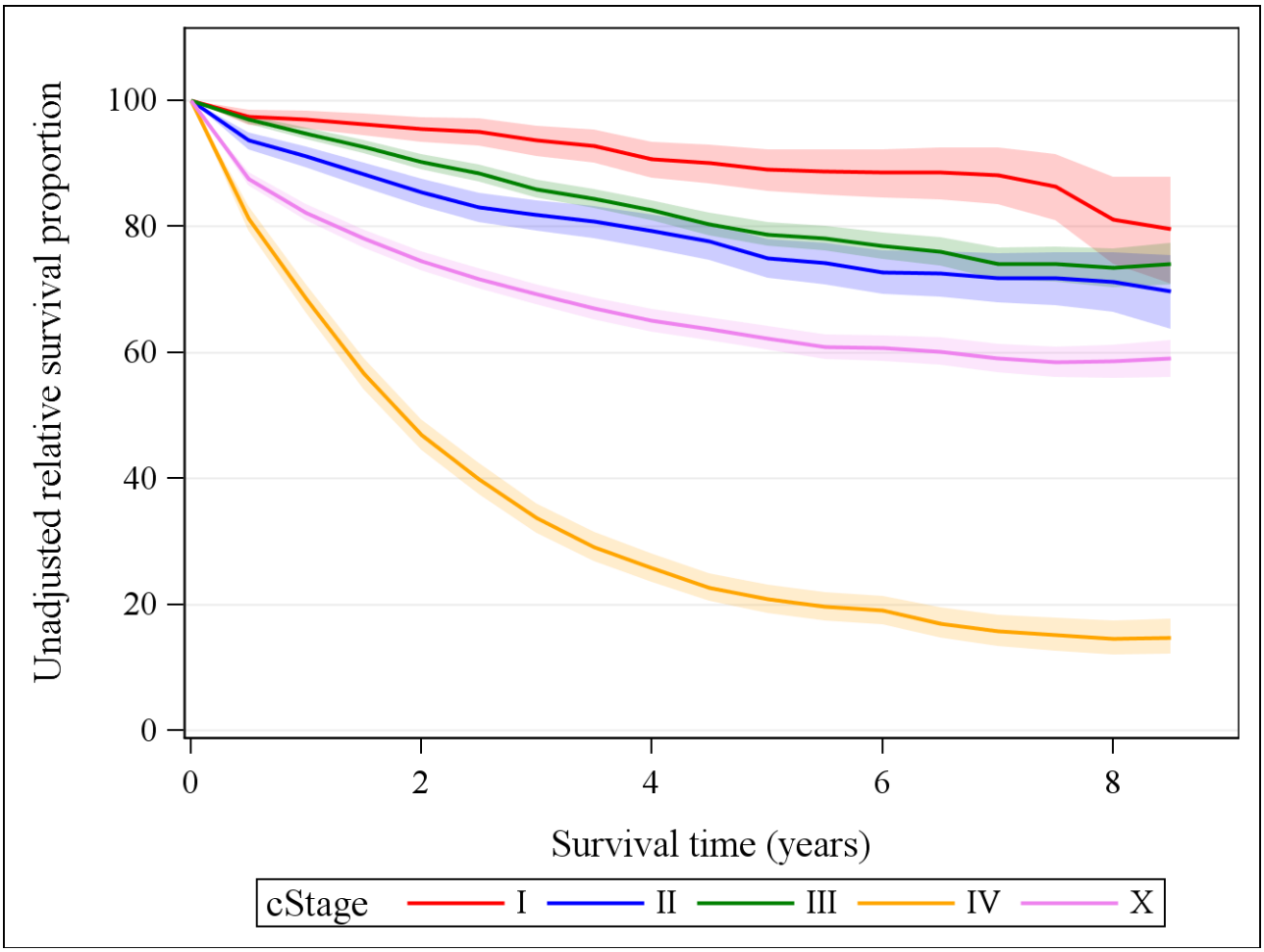

Figure 10. Unadjusted relative survival stratified by clinical stage, Belgium 2006-2011, all patients.

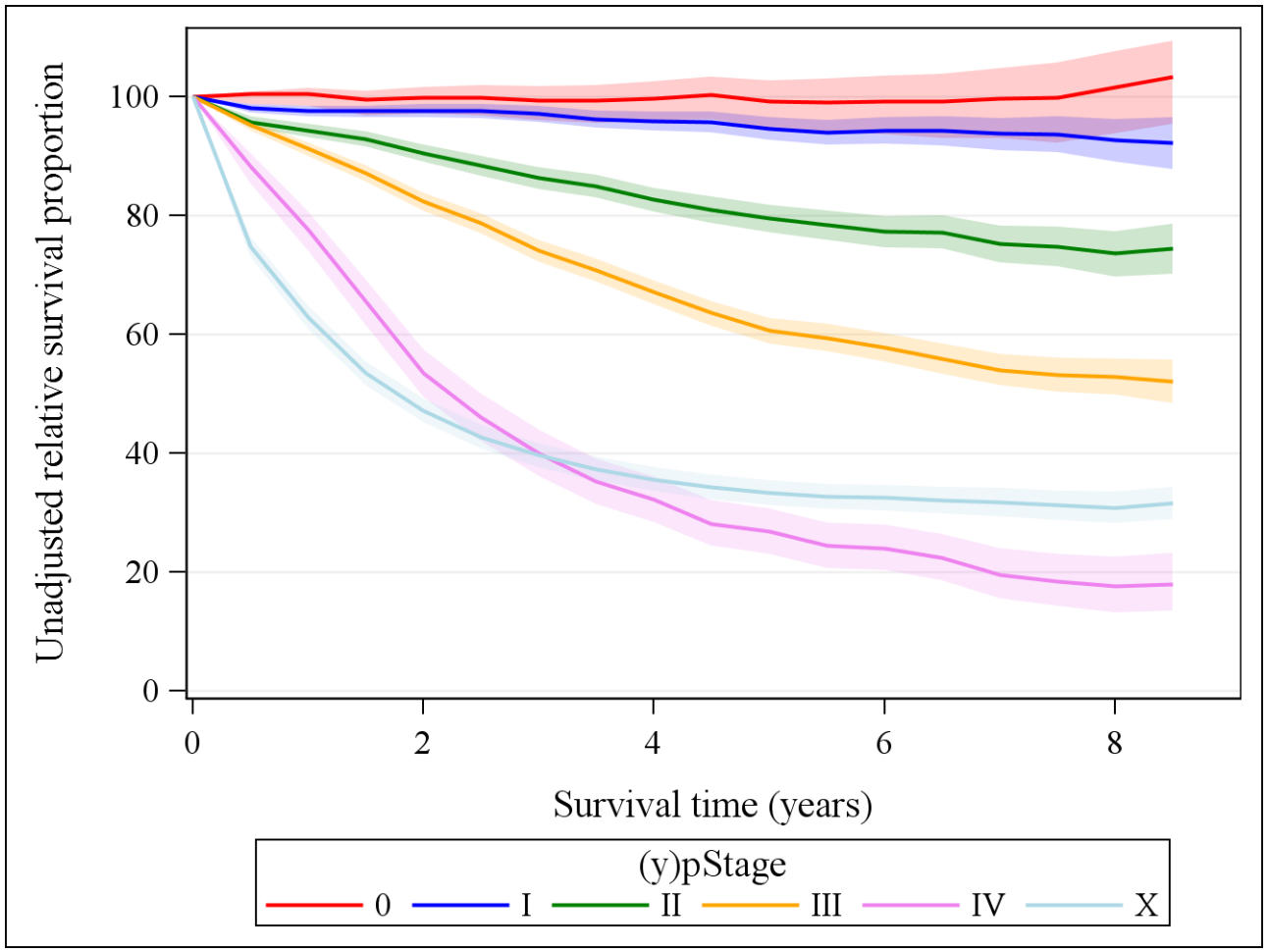

Figure 11. Unadjusted relative survival stratified by pathological stage, Belgium 2006-2011, all patients.

3.1.5. Adjusted relative survival

Due to differences in patient case mix, the relative survival proportions between hospitals cannot directly be compared. In order to correct as much as possible for case mix, an adjustment analysis was performed, adjusting for gender, age, clinical stage, WHO score and having received a radical resection or not.
Results are displayed for centres with at least 100 eligible patients and a minimum follow-up of 5 year.

The forest plot below shows the estimated Relative Excess Risk (RER) per hospital for a death event due to any cause. The reference RER is the one for the average patient. If the reference line cuts the confidence interval for an estimated adjusted RER, the relative survival in that hospital is not significantly different from the national level. If the confidence interval is entirely below/above the reference line, relative survival in that hospital is significantly higher/lower compared to the national level.

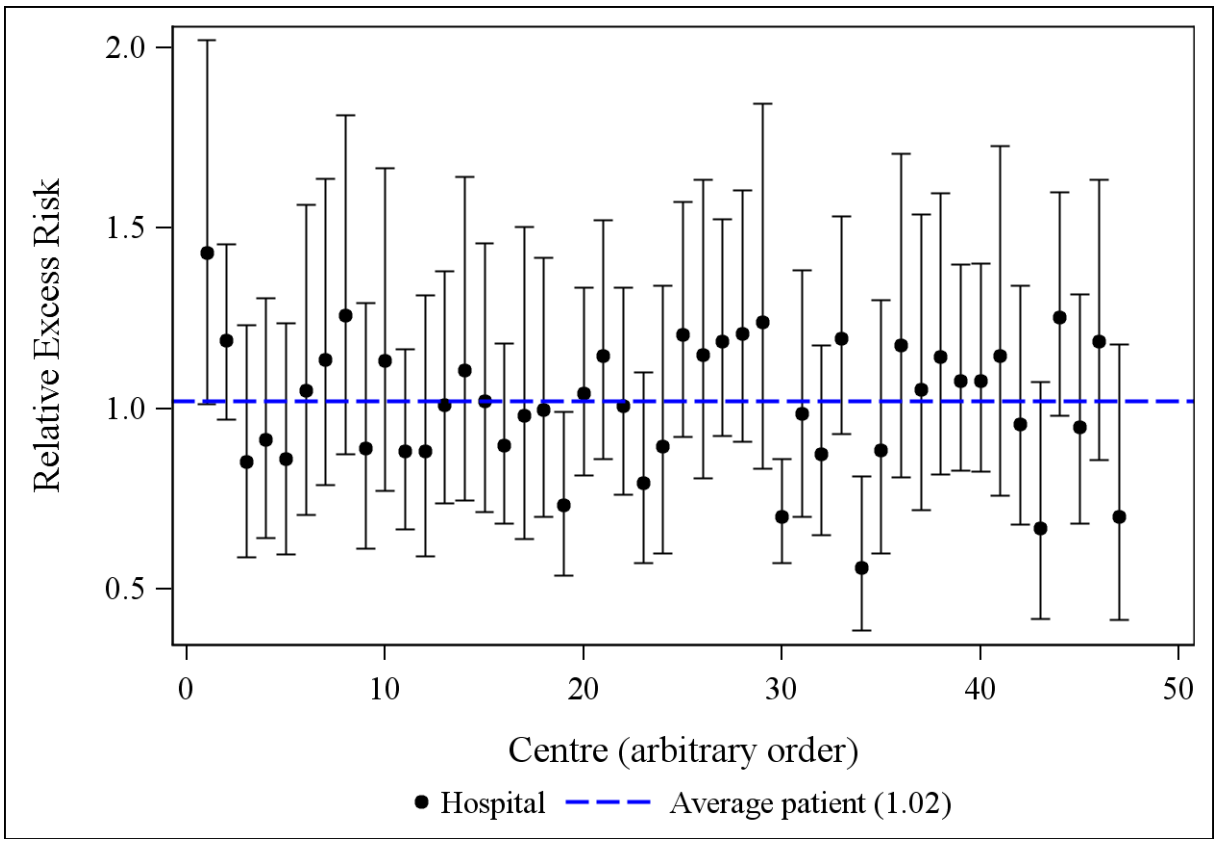

Figure 12. Forest plot of adjusted relative excess risk for all cause mortality with 95% confidence limit, all patients.

3.2. Only patients with radical resection

3.2.1. Exploration patient and tumour characteristics, for patients with radical resection

Table 17. Frequency table of patient and tumour characteristics for Belgium, patients with radical resection.

	Belgium (N=9,961)	
Characteristic	**Number**	**%**
Age group		
<60 year	2,320	23.29
60-74 year	4,418	44.35
75+ year	3,223	32.36
Gender		
Males	6,104	61.28
Females	3,857	38.72
Clinical stage		
0	11	0.11
I	941	9.45
II	1,429	14.35
III	3,456	34.70
IV	834	8.37
X	3,290	33.03
(y)Pathological stage		
0	340	3.41
is	40	0.40
I	2,480	24.90
II	2,591	26.01
III	3,174	31.86
IV	551	5.53
X	785	7.88
WHO score		
Missing	2,059	20.67
0	1,326	13.31
1	5,614	56.36
2	822	8.25
3+	140	1.41
Radical resection		
Yes, for (y)pStage 0,is,I-III	8,625	86.59
Yes, for (y)pStage IV	551	5.53
Yes, for (y)pStage X	785	7.88

3.2.2. Unadjusted observed survival

Table 18. Unadjusted observed survival stratified by baseline characteristics for Belgium, patients with radical resection.

Characteristic	Unadjusted Observed Survival at 5 year Belgium		
	Number at risk	OS (%)	95% CI
Overall	9,961	64.1	[63.2, 65.2]
Age group			
<60 year	2,320	78.0	[76.2, 79.8]
60-74 year	4,418	70.9	[69.5, 72.3]
75+ year	3,223	44.9	[43.1, 46.8]
Gender			
Females	3,857	66.3	[64.7, 67.9]
Males	6,104	62.8	[61.5, 64.1]
Clinical stage			
0	11	NA (N<20)	
I	941	76.8	[73.8, 79.6]
II	1,429	67.5	[64.8, 70.1]
III	3,456	72.1	[70.5, 73.8]
IV	834	31.6	[28.2, 35.1]
X	3,290	58.9	[57.2, 60.7]
(y)Pathological stage			
0	340	88.3	[84.1, 91.5]
I	2,480	80.9	[79.2, 82.5]
II	2,591	66.9	[65.0, 68.8]
III	3,174	52.0	[50.1, 53.9]
IV	551	27.4	[23.6, 31.5]
X	785	65.8	[62.2, 69.2]
is	40	82.7	[61.4, 92.9]
WHO score			
0	1,326	74.3	[71.7, 76.7]
1	5,614	65.4	[64.1, 66.8]
2	822	56.7	[53.2, 60.1]
3+	140	35.1	[27.1, 43.2]
Missing	2,059	59.4	[57.2, 61.6]
Radical resection			
Yes, for (y)pStage 0,is,I-III	8,625	66.3	[65.3, 67.4]
Yes, for (y)pStage IV	551	27.4	[23.6, 31.5]
Yes, for (y)pStage X	785	65.8	[62.2, 69.2]

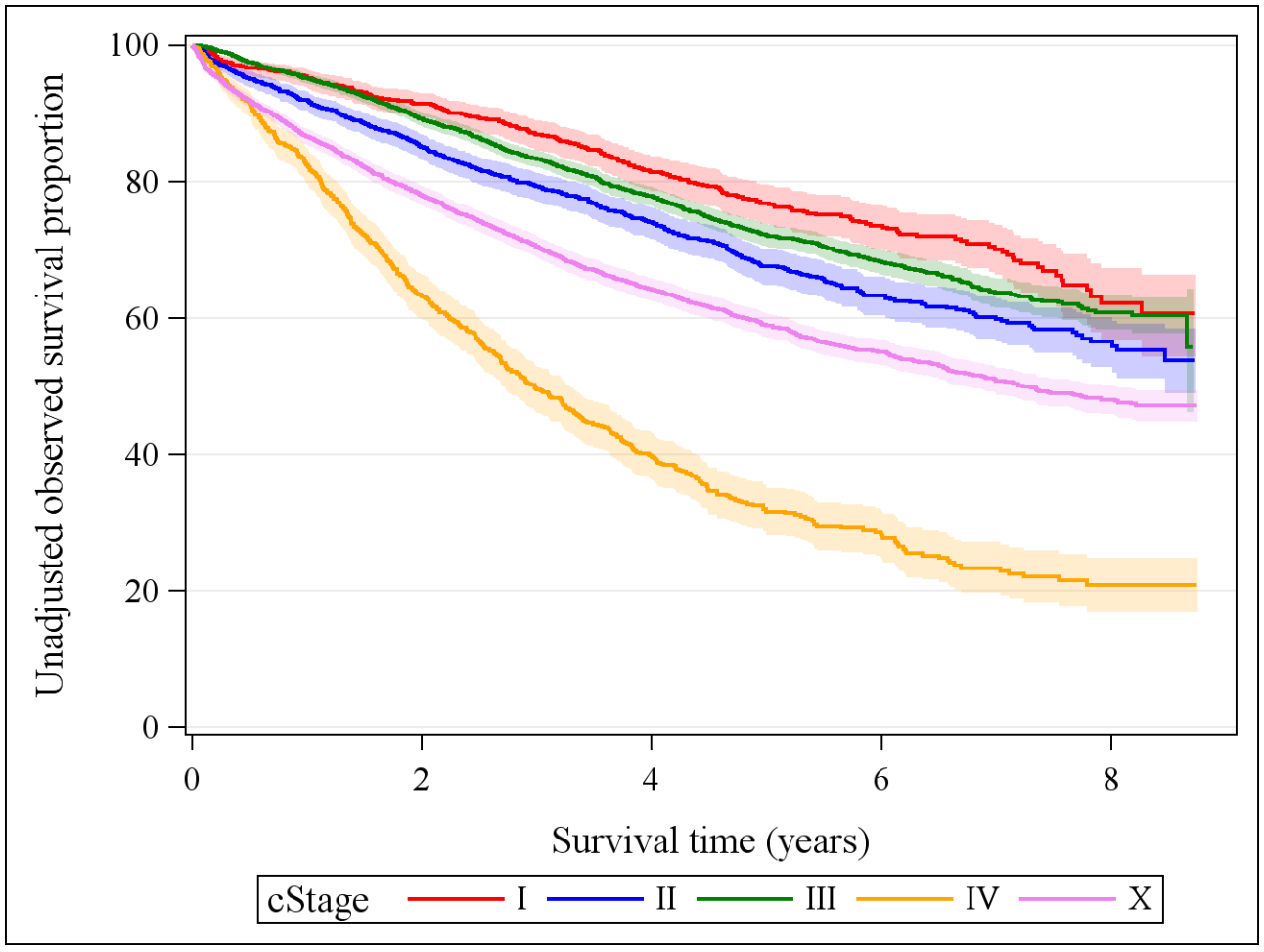

Figure 13. Kaplan-Meier plot of unadjusted observed survival stratified by clinical stage, Belgium 2006-2011, for patients with radical resection.

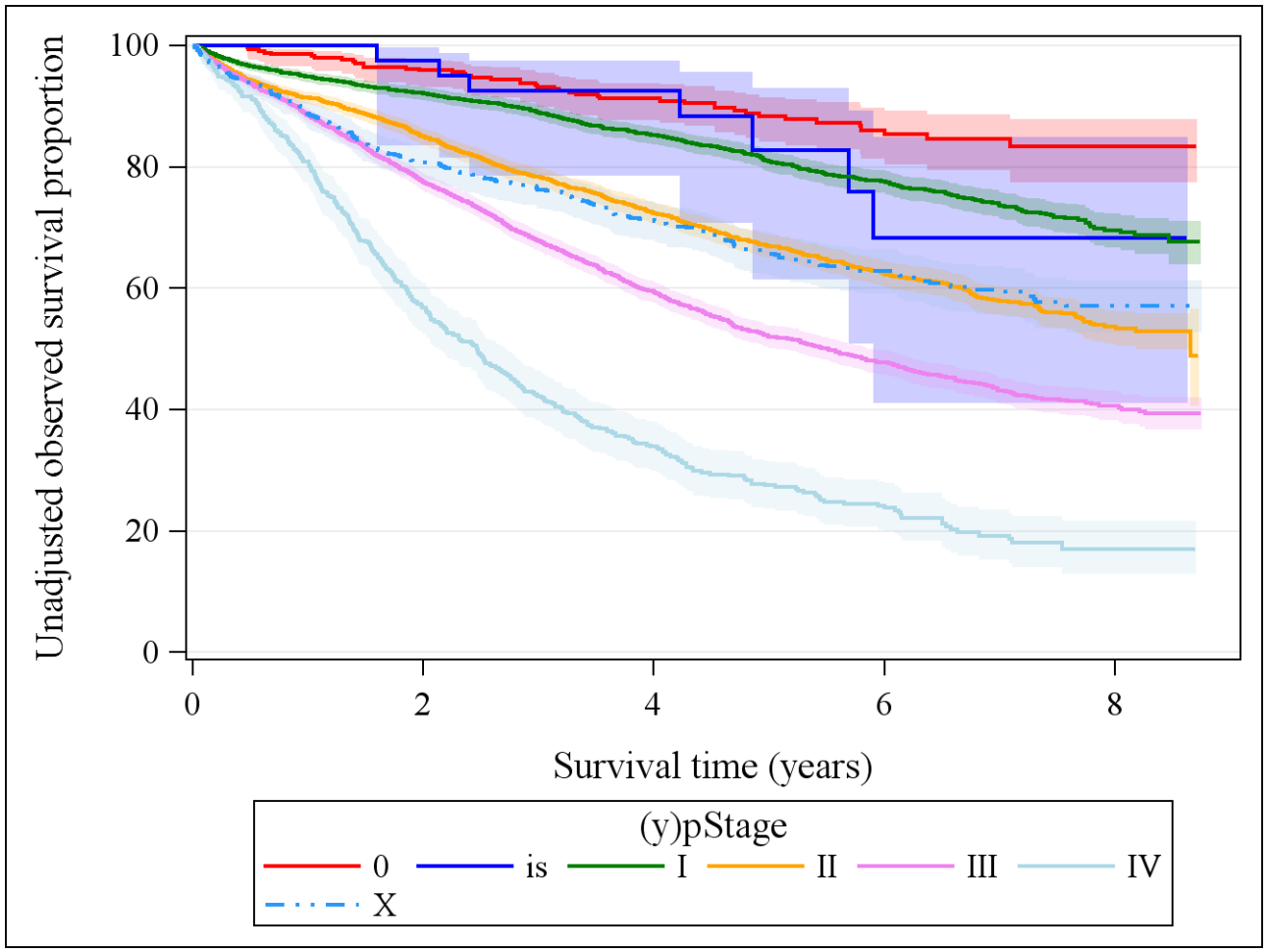

Figure 14. Kaplan-Meier plot of unadjusted observed survival stratified by pathological stage, Belgium 2006-2011, for patients with radical resection.

3.2.3. Adjusted observed survival

Due to differences in patient case mix, the observed survival proportions between hospitals cannot directly be compared. In order to correct as much as possible for case mix, an adjustment analysis was performed, adjusting for gender, age, clinical stage and WHO score.
Results are displayed for centres with at least 50 eligible patients and a minimum follow-up of 5 year.

The forest plot below shows the estimated Hazard Ratio (HR) per hospital for a death event due to any cause. The reference HR is the one for the average patient. If the reference line cuts the confidence interval for an estimated adjusted HR, the survival rate in that hospital is not significantly different from the national level. If the confidence interval is entirely below/above the reference line, survival in that hospital is significantly higher/lower compared to the national level.

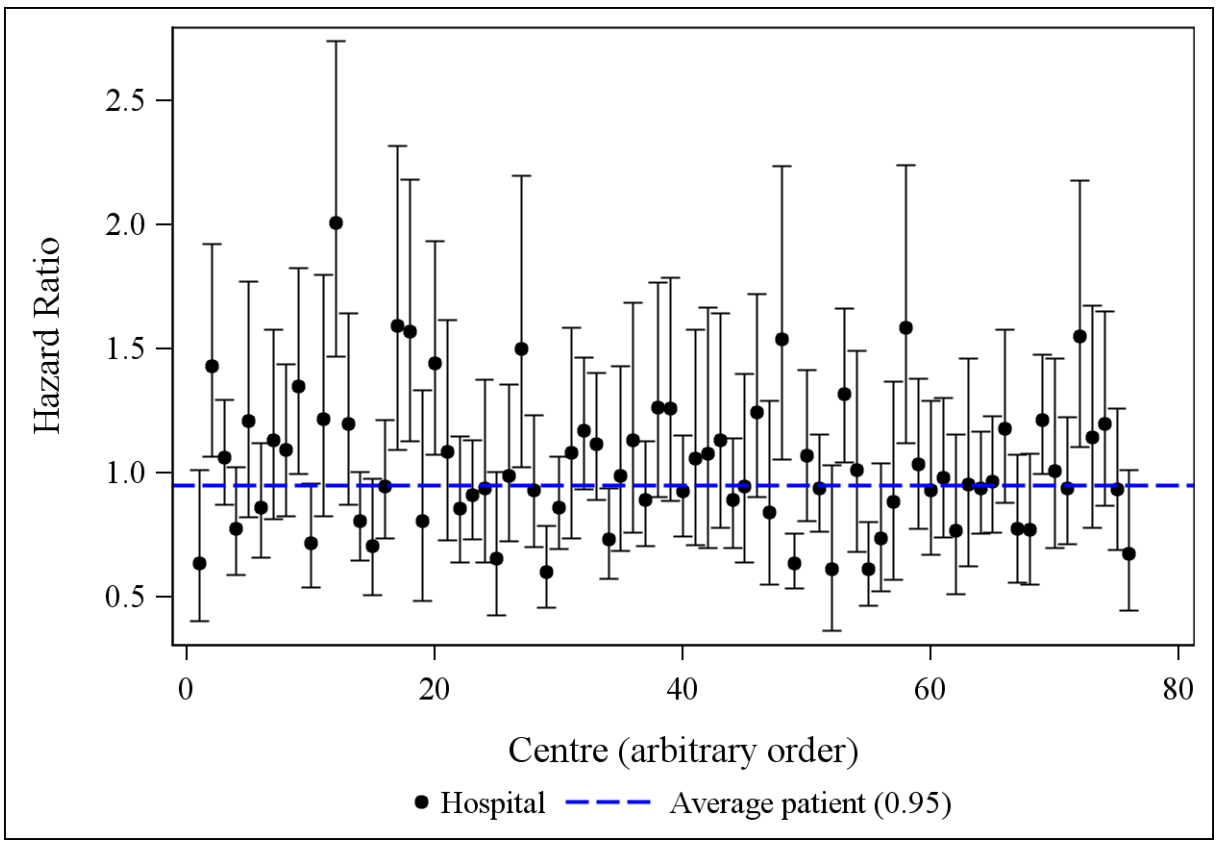

Figure 15. Forest plot of adjusted hazard ratio for all cause mortality with 95% confidence limit, patients with radical resection.

3.2.4. Unadjusted relative survival

Table 19. Unadjusted relative survival stratified by baseline characteristics for Belgium, patients with radical resection.

Characteristic	Unadjusted Relative Survival at 5 year Belgium		
	Number at risk	RS (%)	95% CI
Overall	9,961	76.0	[74.9, 77.2]
Age group			
<60 year	2,320	80.3	[78.4, 82.1]
60-74 year	4,418	78.8	[77.2, 80.4]
75+ year	3,223	68.7	[65.9, 71.5]
Gender			
Males	6,104	75.5	[74.0, 77.1]
Females	3,857	76.7	[74.9, 78.6]
Clinical stage			
0	11	NA (N<50)	
I	941	92.3	[88.7, 95.7]
II	1,429	81.2	[78.0, 84.3]
III	3,456	83.1	[81.2, 85.0]
IV	834	35.8	[32.0, 39.7]
X	3,290	72.0	[69.9, 74.2]
(y)Pathological stage			
0	340	98.9	[94.2, 102.5]
is	40	NA (N<50)	
I	2,480	96.0	[94.0, 98.0]
II	2,591	81.0	[78.6, 83.3]
III	3,174	61.5	[59.3, 63.7]
IV	551	30.9	[26.6, 35.5]
X	785	76.5	[72.3, 80.5]
WHO score			
Missing	2,059	71.5	[68.8, 74.1]
0	1,326	85.2	[82.2, 88.0]
1	5,614	77.3	[75.7, 78.9]
2	822	69.4	[65.1, 73.6]
3+	140	44.2	[34.1, 54.5]
Radical resection			
Yes, for (y)pStage 0,is,I-III	8,625	78.9	[77.7, 80.2]
Yes, for (y)pStage IV	551	30.9	[26.6, 35.5]
Yes, for (y)pStage X	785	76.5	[72.3, 80.5]

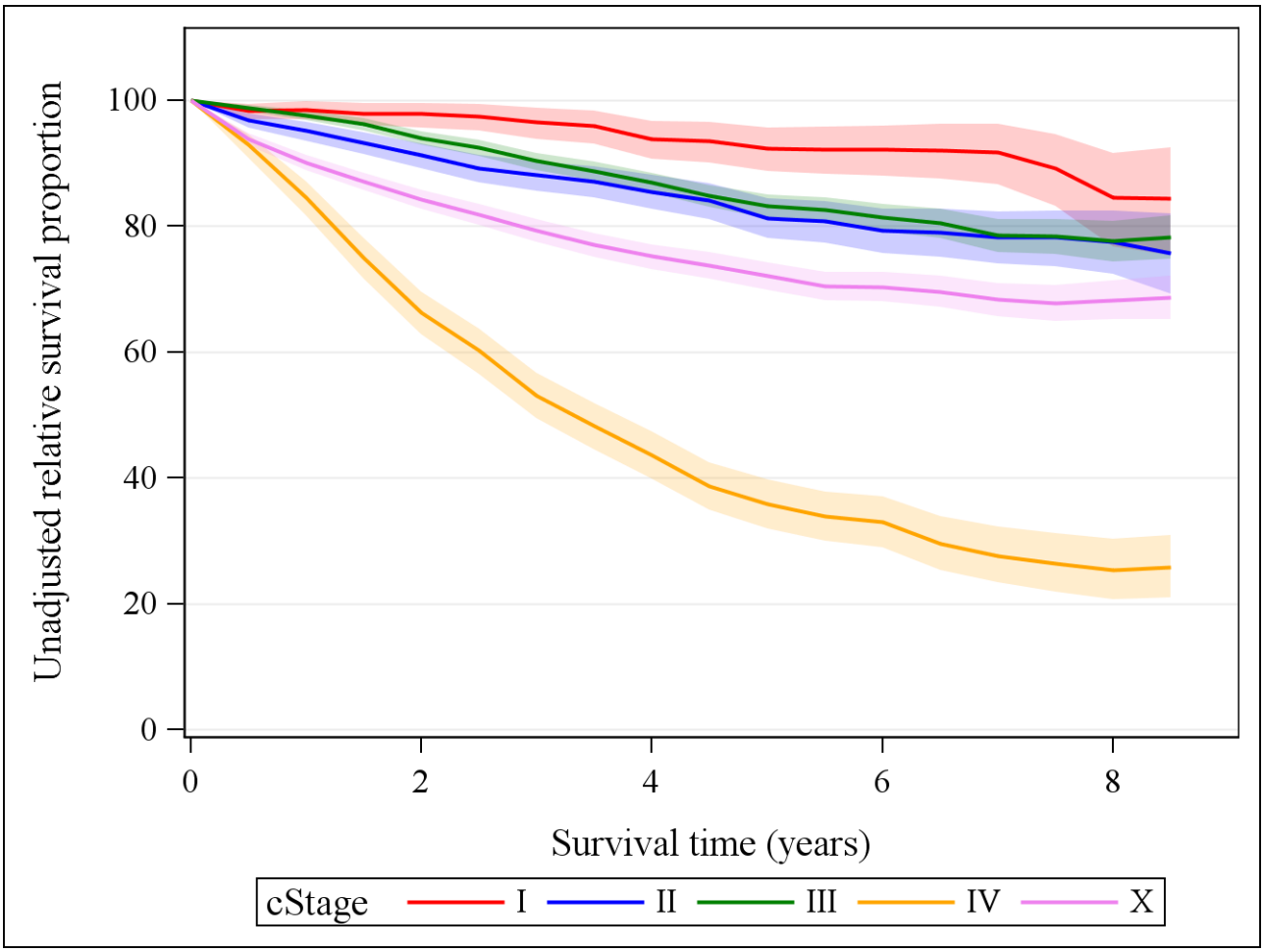

Figure 16. Unadjusted relative survival stratified by clinical stage, Belgium 2006-2011, for patients with radical resection.

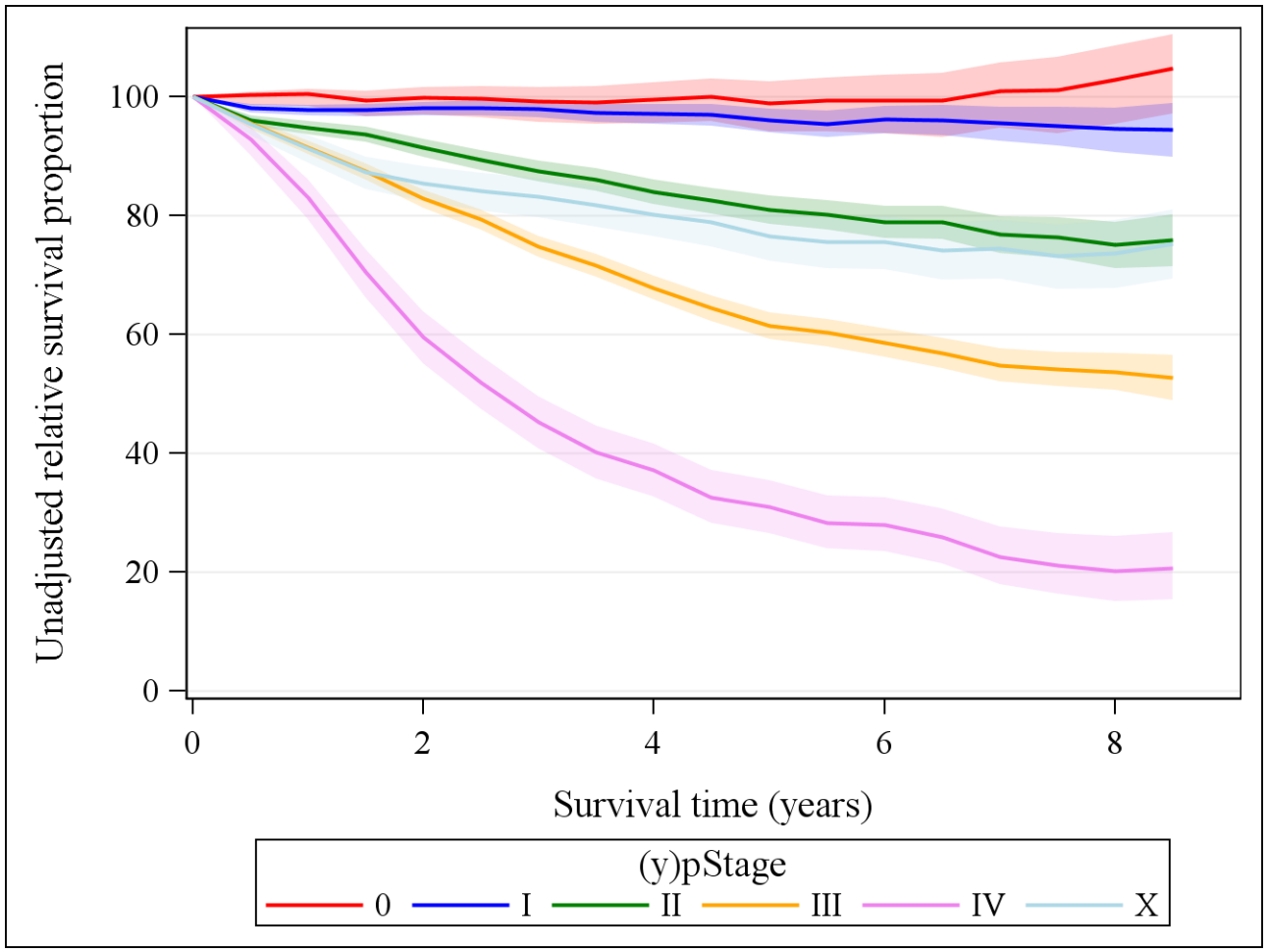

Figure 17. Unadjusted relative survival stratified by pathological stage, Belgium 2006-2011, for patients with radical resection.

3.2.5. Adjusted relative survival

Due to differences in patient case mix, the relative survival proportions between hospitals cannot be directly compared. In order to correct as much as possible for case mix, an adjustment analysis was performed, adjusting for gender, age, clinical stage and WHO score.
Adjustment results are only reported for hospitals with at least 100 eligible patients and a minimum follow-up of 5 year.

The forest plot below shows the estimated Relative Excess Risk (RER) per hospital for a death event due to any cause. The reference RER is the one for the average patient. If the reference line cuts the confidence interval for an estimated adjusted RER, the relative survival in that hospital is not significantly different from the national level. If the confidence interval is entirely below/above the reference line, relative survival in that hospital is significantly higher/lower compared to the national level.

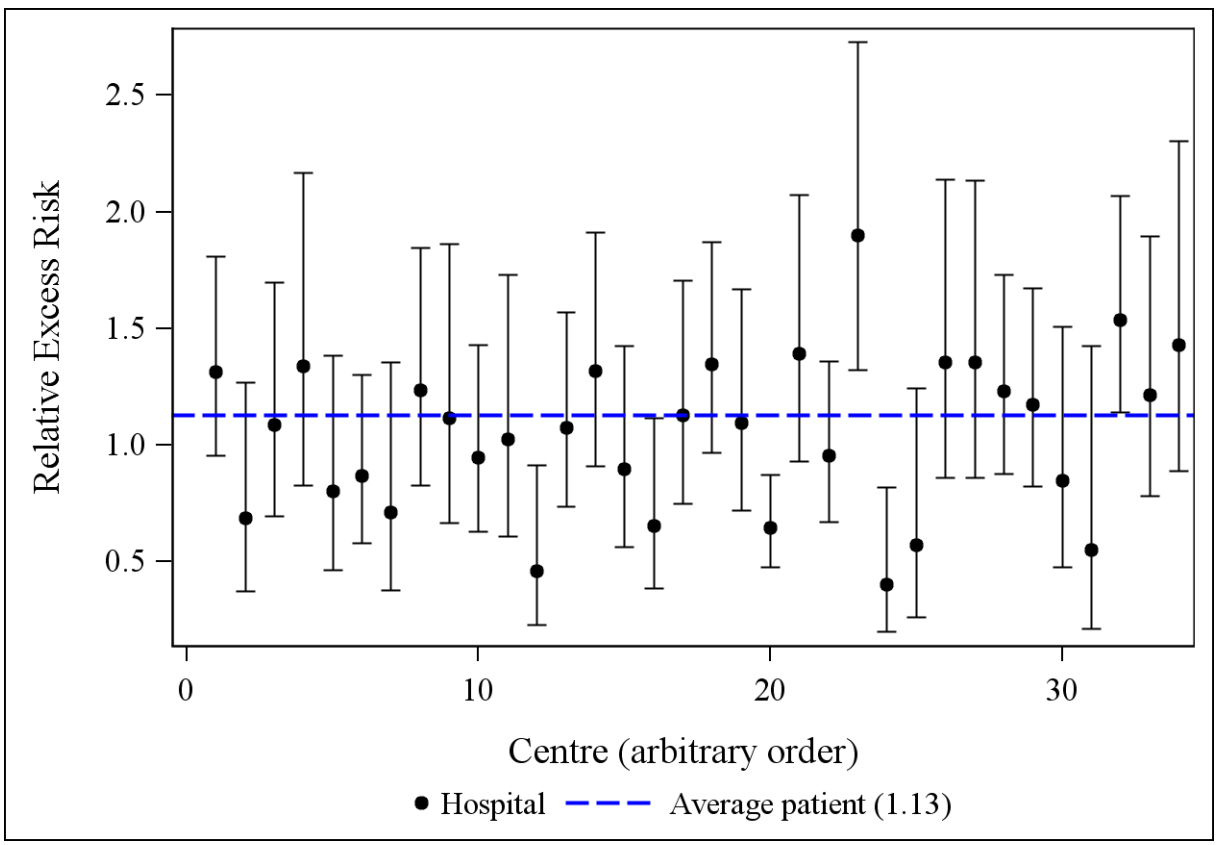

Figure 18. Forest plot of adjusted relative excess risk for all cause mortality with 95% confidence limit, patients with radical resection.

3.2.6. Unadjusted 30-day postoperative mortality

Table 20. Unadjusted 30-day postoperative mortality stratified by patient and tumour characteristics for Belgium, patients with radical resection.

	Unadjusted 30-day Postoperative Mortality Belgium	
Characteristic	% (n N)	95% CI
Overall	2.6 (260/9,959)	[2.3, 2.9]
Age group		
<60 year	0.3 (8/2,320)	[0.1, 0.6]
60-74 year	1.2 (55/4,417)	[0.9, 1.6]
75+ year	6.1 (197/3,222)	[5.3, 7.0]
Gender		
Females	2.4 (94/3,856)	[2.0, 2.9]
Males	2.7 (166/6,103)	[2.3, 3.1]
Clinical stage		
0	0.0 (0/11)	_
I	1.4 (13/941)	[0.6, 2.1]
II	2.6 (37/1,429)	[1.8, 3.4]
III	1.4 (48/3,455)	[1.0, 1.8]
IV	3.2 (27/834)	[2.0, 4.4]
X	4.1 (135/3,289)	[3.4, 4.8]
(y)Pathological stage		
0	0.3 (1/340)	[0.0, 0.9]
I	1.9 (48/2,479)	[1.4, 2.5]
II	2.9 (74/2,591)	[2.2, 3.5]
III	2.8 (89/3,173)	[2.2, 3.4]
IV	3.1 (17/551)	[1.8, 4.5]
X	3.9 (31/785)	[2.7, 5.4]
is	0.0 (0/40)	_
WHO score		
0	1.1 (14/1,325)	[0.5, 1.7]
1	1.9 (109/5,613)	[1.6, 2.3]
2	3.0 (25/822)	[1.9, 4.3]
3+	6.4 (9/140)	[2.9, 10.7]
Missing	5.0 (103/2,059)	[4.1, 6.0]

3.2.7. Adjusted 30-day postoperative mortality

Due to differences in patient case mix, the unadjusted 30-day postoperative mortality proportions between hospitals cannot directly be compared. In order to correct as much as possible for case mix, an adjustment analysis was performed, adjusting for gender, age, clinical stage and WHO score.
Results are displayed for centres with at least 50 eligible patients.

The forest plot below shows the estimated Odds Ratio (OR) per hospital for a postoperative death within 30 days due to any cause, adjusted for: gender, age, clinical stage and WHO score. The reference OR is the one for the average patient. If the reference line cuts the confidence interval for an estimated adjusted OR, the 30-day postoperative mortality in that hospital is not significantly different from the national level. If the confidence interval is entirely below/above the reference line, 30-day postoperative mortality in that hospital is significantly lower/higher compared to the national level.

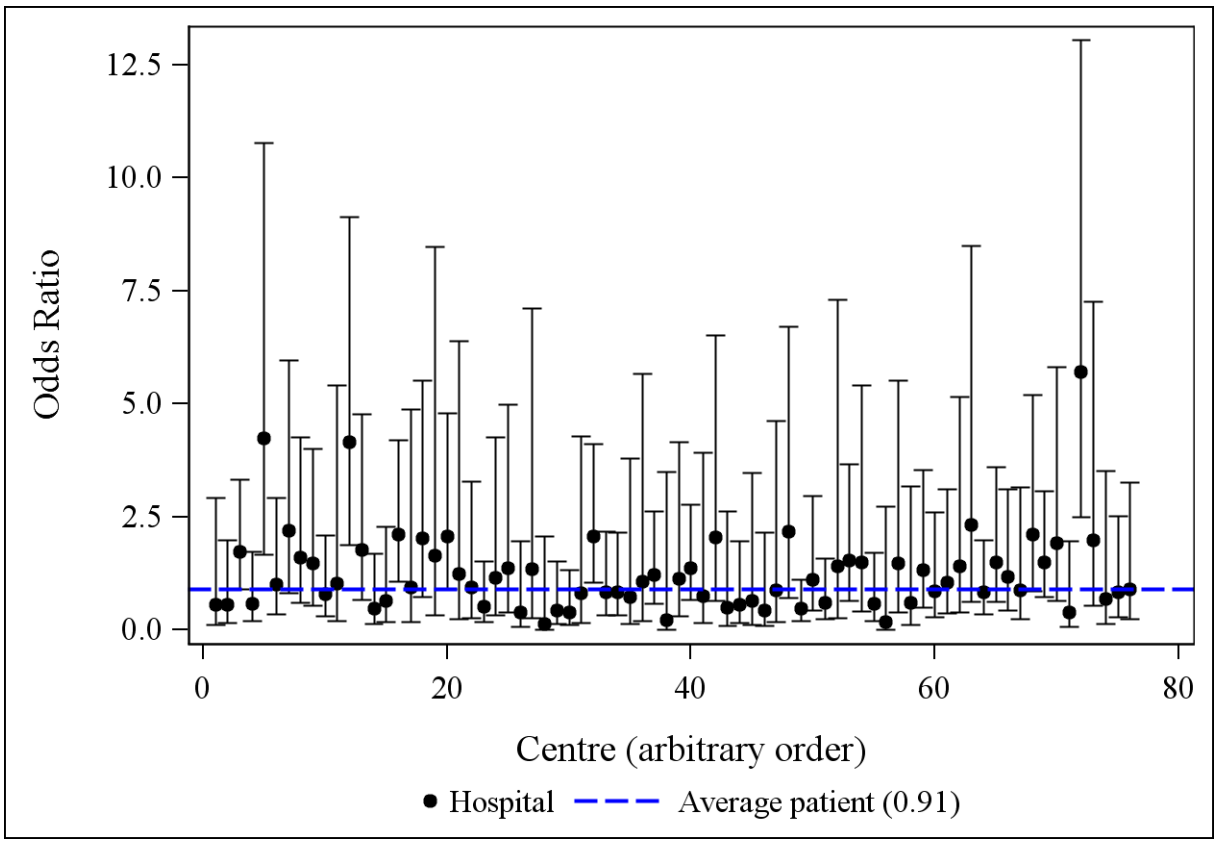

Figure 19. Forest plot of adjusted odds ratio for all cause 30-day postoperative mortality with 95% confidence limit, patients with radical resection.

3.2.8. Unadjusted 90-day postoperative mortality

Table 21. Unadjusted 90-day postoperative mortality stratified by patient and tumour characteristics for Belgium, patients with radical resection.

	Unadjusted 90-day Postoperative Mortality Belgium	
Characteristic	**% (n/N)**	**95% CI**
Overall	4.7 (470/9,958)	[4.3, 5.1]
Age group		
<60 year	1.1 (26/2,319)	[0.7, 1.6]
60-74 year	2.6 (117/4,417)	[2.2, 3.1]
75+ year	10.1 (327/3,222)	[9.1, 11.2]
Gender		
Females	4.4 (169/3,856)	[3.8, 5.0]
Males	4.9 (301/6,102)	[4.4, 5.5]
Clinical stage		
0	0.0 (0/11)	_
I	2.8 (26/941)	[1.8, 3.8]
II	4.8 (68/1,429)	[3.7, 5.9]
III	2.6 (89/3,455)	[2.1, 3.1]
IV	7.7 (64/834)	[5.9, 9.5]
X	6.8 (223/3,288)	[5.9, 7.7]
(y)Pathological stage		
0	0.6 (2/340)	[0.0, 1.5]
I	3.0 (75/2,479)	[2.4, 3.7]
II	5.2 (135/2,591)	[4.4, 6.1]
III	5.5 (173/3,173)	[4.7, 6.2]
IV	7.1 (39/551)	[5.1, 9.3]
X	5.9 (46/784)	[4.3, 7.5]
is	0.0 (0/40)	_
WHO score		
0	1.9 (25/1,325)	[1.2, 2.6]
1	3.7 (208/5,613)	[3.2, 4.2]
2	6.0 (49/822)	[4.4, 7.7]
3+	19.3 (27/140)	[12.9, 25.7]
Missing	7.8 (161/2,058)	[6.7, 9.0]

3.2.9. Adjusted 90-day postoperative mortality

Due to differences in patient case mix, the unadjusted 90-day postoperative mortality proportions between hospitals cannot directly be compared. In order to correct as much as possible for case mix, an adjustment analysis was performed, adjusting for gender, age, clinical stage and WHO score.
Results are displayed for centres with at least 50 eligible patients.

The forest plot below shows the estimated Odds Ratio (OR) per hospital for a postoperative death within 90 days due to any cause, adjusted for: gender, age, clinical stage and WHO score. The reference OR is the one for the average patient. If the reference line cuts the confidence interval for an estimated adjusted OR, the 90-day postoperative mortality in that hospital is not significantly different from the national level. If the confidence interval is entirely below/above the reference line, 90-day postoperative mortality in that hospital is significantly lower/higher compared to the national level.

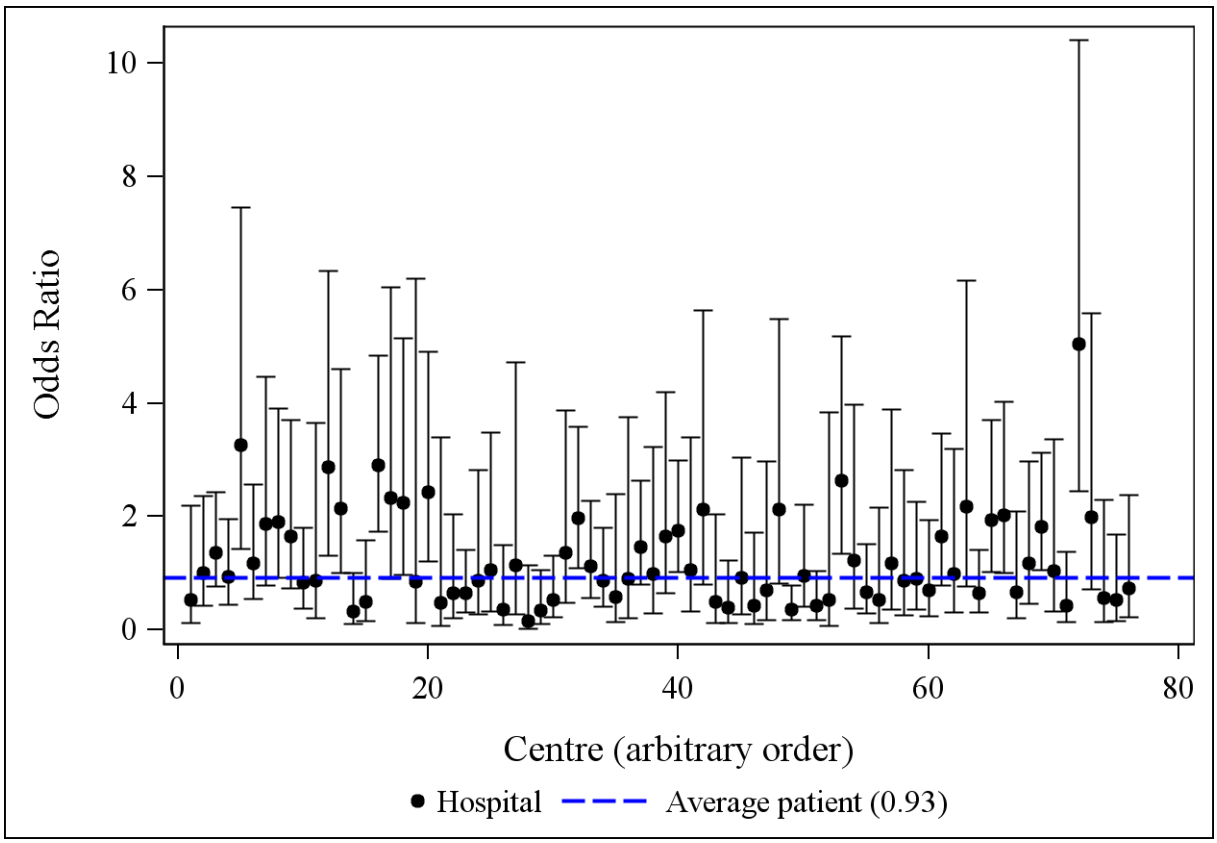

Figure 20. Forest plot of adjusted odds ratio for all cause 90-day postoperative mortality with 95% confidence limit, patients with radical resection.