

## Supplementary Tables

**Supplementary Table 1. Standardized Incidence Ratios (SIRs) of liver cancer diagnosed after lower GI bleeding, by follow-up period and comorbidities.**

	Total follow-up		<1 year		1-<5 years		5+ years	
	O	SIR (95% CI)	O	SIR (95% CI)	O	SIR (95% CI)	O	SIR (95% CI)
<b>Overall Liver cancer</b>	86	2.80 (2.24-3.46)	37	6.74 (4.74-9.29)	33	2.14 (1.47-3.00)	16	1.64 (0.93-2.66)
<b>Charlson score<sup>a</sup></b>								
Low (0)	24	1.33 (0.85-1.98)	8	2.99 (1.29-5.89)	9	1.03 (0.47-1.96)	7	1.06 (0.42-2.18)
Medium (1-2)	35	3.45 (2.40-4.79)	13	6.23 (3.31-10.7)	16	3.01 (1.72-4.88)	6	2.18 (0.80-4.76)
High (3+)	27	10.6 (6.97-15.4)	16	22.1 (12.6-35.8)	8	5.71 (2.46-11.3)	3	7.02 (1.45-20.5)
<b>Alcoholism-related disease</b>								
No	59	1.99 (1.52-2.57)	22	4.18 (2.62-6.33)	26	1.75 (1.14-2.56)	11	1.16 (0.58-2.08)
Yes	27	24.5 (16.2-35.7)	15	66.2 (37.0-109)	7	12.4 (4.97-25.6)	5	16.1 (5.22-37.5)
<b>Chronic liver disease<sup>b</sup></b>								
No	57	1.89 (1.43-2.44)	22	4.09 (2.56-6.19)	23	1.51 (0.96-2.27)	12	1.24 (0.64-2.17)
Mild	17	48.3 (28.1-77.3)	9	121 (55.5-230)	5	27.4 (8.87-63.8)	3	31.5 (6.49-92.1)
Moderate-severe	12	86.0 (44.4-150)	6	160 (58.7-348)	5	68.1 (22.1-159)	1	34.8 (0.88-194)

SIR, standardized incidence ratio; GI, gastrointestinal; O, observed number of patients; CI, confidence interval

<sup>a</sup>Charlson Comorbidity Index (see diagnoses in Appendix).

<sup>b</sup>Chronic liver disease according to Charlson Comorbidity Index (specified in the Appendix).

**Supplementary Table 2. Standardized Incidence Ratios (SIRs) of pancreatic cancer after lower GI bleeding, by follow-up period and comorbidities.**

	Total follow-up		<1 year		1-<5 years		5+ years	
	O	SIR (95% CI)	O	SIR (95% CI)	O	SIR (95% CI)	O	SIR (95% CI)
<b>Overall pancreatic cancer</b>	144	1.53 (1.29-1.80)	47	2.82 (2.07-3.75)	55	1.16 (0.88-1.51)	42	1.40 (1.01-1.89)
<b>Charlson score<sup>a</sup></b>								
Low (0)	80	1.45 (1.15-1.81)	24	2.96 (1.89-4.40)	30	1.12 (0.76-1.60)	26	1.28 (0.84-1.88)
Medium (1-2)	49	1.57 (1.16-2.08)	15	2.35 (1.32-3.88)	21	1.28 (0.79-1.96)	13	1.55 (0.82-2.64)
High (3+)	15	1.96 (1.10-3.24)	8	3.66 (1.58-7.22)	4	0.96 (0.26-2.46)	3	2.34 (0.48-6.82)
<b>Alcoholism-related disease</b>								
No	135	1.48 (1.24-1.75)	44	2.73 (1.99-3.67)	53	1.16 (0.87-1.51)	38	1.30 (0.92-1.78)
Yes	9	3.26 (1.50-6.20)	3	5.15 (1.06-15.0)	2	1.40 (0.17-5.07)	4	5.33 (1.45-13.6)
<b>Chronic liver disease<sup>b</sup></b>								
No	141	1.52 (1.28-1.80)	45	2.75 (2.01-3.68)	54	1.16 (0.87-1.51)	42	1.42 (1.02-1.91)
Mild	2	1.96 (0.24-7.09)	1	4.65 (0.12-25.9)	1	1.87 (0.05-10.4)	0	-
Moderate-severe	1	2.70 (0.07-15.0)	1	9.71 (0.25-54.1)	0	-	0	-

SIR, standardized incidence ratio; GI, gastrointestinal; O, observed number of patients; CI, confidence interval

<sup>a</sup> Charlson Comorbidity Index (see diagnoses in Appendix)

<sup>b</sup> Chronic liver disease according to Charlson Comorbidity Index (specified in the Appendix).

**Supplementary Table 3. Absolute risk of GI cancer after 1 year of follow-up, by age group and place of diagnosis.**

	Absolute risk in % (95% CI)		
	0-49 years	50-69 years	70+ years
<b>All hospital settings</b>	0.42 (0.34-0.52)	4.01 (3.75-4.29)	6.42 (6.08-6.78)
<b>Emergency room</b>	0.79 (0.45-1.29)	7.81 (6.38-9.42)	8.22 (6.95-9.63)
<b>Inpatient unit</b>	0.40 (0.26-0.59)	4.98 (4.50-5.49)	5.33 (4.94-5.73)
<b>Outpatient clinic</b>	0.37 (0.27-0.50)	3.00 (2.70-3.32)	8.55 (7.80-9.35)

GI, gastrointestinal; CI, confidence interval

## Appendix

### Lower gastrointestinal bleeding

We included patients with following diagnosis codes for hemorrhage of anus and rectum to investigate lower gastrointestinal (GI) bleeding. Before 1995 similar codes were used to exclude patients, as we only wanted to investigate first-time lower GI bleeding patients.

	<b>ICD-8</b> 1977-1993:	<b>ICD-10</b> 1994-2011 (from 1995 in outpatient visits):
Inclusion from 1 <sup>st</sup> jan. 1995		K62.5
Exclusion criteria before 1995	569.15	K62.5

### Inflammatory Bowel Disease (IBD)

Patients diagnosed with IBD at any time before admission with lower GI bleeding were excluded, as they were likely to have experienced lower GI bleeding without getting the diagnosis code previously.

	<b>ICD-8</b> 1977-1993:	<b>ICD-10</b> 1994-2011 (from 1995 in outpatient visits):
Exclusion criteria if diagnosed previous to the lower GI bleeding diagnosis	563.01; 563.19; 569.04	K50; K51

### Gastrointestinal cancer

From 1995-2011 we counted following GI cancer types as positive outcomes in patients with lower GI bleeding: esophagus (C15), stomach (C16), small intestines (C17), large intestines (C18-19), rectum (C20), anus (C21), liver (C22), gall bladder and biliary tract (C23-24), pancreas (C25).

We excluded all patients with lower GI bleeding, who before 1995 or before the bleeding diagnosis had any cancer diagnosis (except non-melanoma skin cancer).

We excluded any GI cancer diagnosis from the comorbidity score (see below)

	<b>ICD-10</b> 1978-2011
Outcome during follow-up 1995-2011	C15-C25
Exclusion criteria before 1995	C00-C96 (except C44)

## Co-variates

We used following diagnoses to describe patient characteristics and to perform stratified analyses:

	<b>ICD-8</b> 1977-1993 (1995 for operations):	<b>ICD-10</b> 1994-2011 (from 1995 in outpatient visits):
Endoscopic investigation	91.000 ; 91.010 ; 91.020 ; 91.070; 91.080; 91.090; 91.100; 92.260; 92.280; 92.300; 92.340; 92.360	KUJC; KUJD; KUJF (02, 05, 32, 35, 42, 45, 82, 85, 92); KUJG; KUJH; KJFA15; KJGA05
Adenomas (benign tumor in colon/rectum)	211.31; 211.32; 211.33; 211.34; 211.35; 211.36; 211.38; 211.39; 211.49;	D12; K62.1; K635 KJFA15; KJGA05
Haemorrhoids	455	I84
Chronic liver disease (mild)	571; 573.01; 573.04	B18; K70.0–K70.3; K70.9; K71; K73; K74; K76.0
Chronic liver disease (moderate/severe)	070.00; 070.02; 070.04; 070.06; 070.08; 573.00; 456.00–456.09	B15.0; B16.0; B16.2; B19.0; K70.4; K72; K76.6; I85
Alcoholism-related disorders	291.00-291.99 303.00-303.99 571.09 571.10 577.10	F10.2 – 10.9, G31.2, G62.1, G72.1, I42.6, K29.2, K70, K86.0, Z72.1; E244; E529A; K852; L278A; Z502; Z714; BRHE2
Chronic obstructive pulmonary disease (COPD)	491; 492	DJ44

We used a modified Charlson Comorbidity Index (CCI) to stratify according to past history of comorbidity. Previous GI cancer diagnoses were excluded from the score using diagnosis codes from the DNPR [ICD-8 codes (150.00-159.99) before 1994 and ICD-10 codes (C15-C25) from 1994].

<b>Charlson Comorbidity Index category</b>	<b>ICD-8</b>	<b>ICD-10</b>	<b>Charlson comorbidity index score</b>
Myocardial infarction	410	I21; I22; I23	1
Congestive heart failure	427.09; 427.10; 427.11; 427.19; 428.99; 782.49	I50; I11.0; I13.0; I13.2	1
Peripheral vascular disease	440; 441; 442; 443; 444; 445	I70; I71; I72; I73; I74; I77	1
Cerebrovascular disease	430–438	I60–I69; G45; G46	1
Dementia	290.09–290.19; 293.09	F00–F03; F05.1; G30	1
Chronic pulmonary disease	490–493; 515–518	J40–J47; J60–J67; J68.4; J70.1; J70.3; J84.1; J92.0; J96.1; J98.2; J98.3	1
Connective tissue disease	712; 716; 734; 446; 135.99	M05; M06; M08; M09; M30– M36; D86	1
Ulcer disease	530.91; 530.98; 531–534	K22.1; K25–K28	1
Mild liver disease	571; 573.01; 573.04	B18; K70.0–K70.3; K70.9; K71; K73; K74; K76.0	1
Diabetes without end-organ damage	249.00; 249.06; 249.07; 249.09; 250.00; 250.06; 250.07; 250.09	E10.0; E10.1; E10.9; E11.0; E11.1; E11.9	
Hemiplegia	344	G81; G82	2
Moderate to severe renal disease	403; 404; 580–584; 590.09; 593.19; 753.10–753.19; 792	I12; I13; N00–N05; N07; N11; N14; N17–N19; Q61	2
Diabetes with end-organ damage	249.01–249.05; 249.08; 250.01–250.05; 250.08	E10.2–E10.8; E11.2–E11.8	2
Any cancer (except GI cancer )	140–149 160-194	C00-14 C26-C49, C51–C75	2
Leukemia	204–207	C91–C95	2
Lymphoma	200–203; 275.59	C81–C85; C88; C90; C96	2
Moderate to severe liver disease	070.00; 070.02; 070.04; 070.06; 070.08; 573.00; 456.00–456.09	B15.0; B16.0; B16.2; B19.0; K70.4; K72; K76.6; I85	3
Metastatic solid tumor	195–199	C76–C80	6
AIDS	079.83	B21–B24	6