



The influence of socioeconomic circumstances on survival after surgery for colorectal cancer

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In collaboration with the West of Scotland Colorectal Cancer Managed Clinical Network

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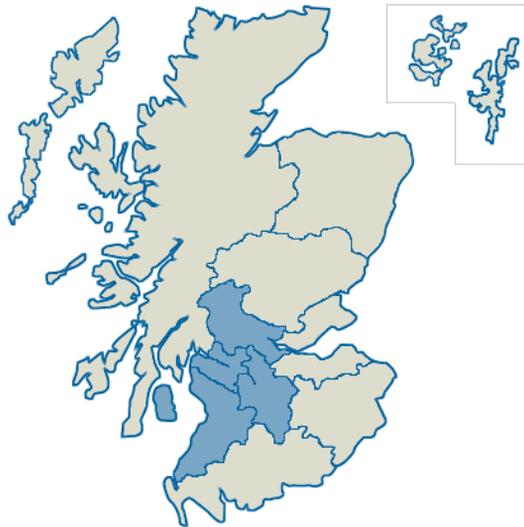
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Colorectal Cancer Survival

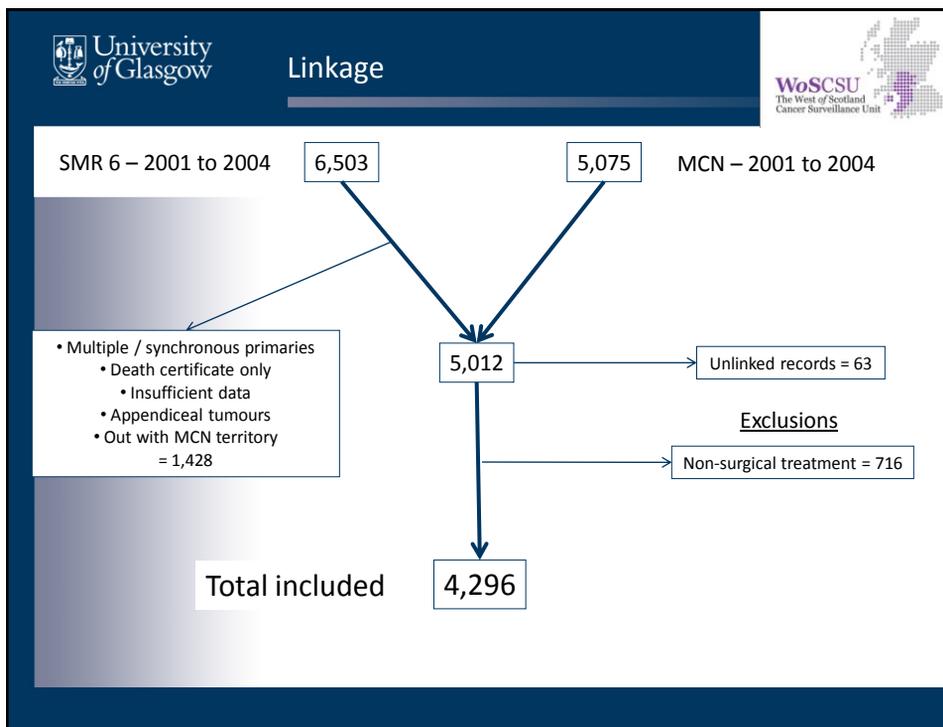
- Survival from colorectal cancer continues to improve
- Deprivation gap exists favouring the most affluent
- Widening socioeconomic gradients reported
- Unclear if survival gradient due to treatment, tumour or patient-related factors

Examine the influence of socioeconomic
circumstances on short and longer-term
outcome after surgery for colorectal cancer



- Incident cases of colorectal cancer extracted from Scottish Cancer Registry (SMR 6) 2001 to 2004
- Linked to –
 - West of Scotland Colorectal Cancer Managed Clinical Network (MCN) audit database
 - General Registry Office for Scotland death records
 - Scottish Morbidity Records (SMR 1)
 - Previous inpatient bed-days
- Scottish Index of Multiple Deprivation (SIMD)

- Post-operative mortality = death <30 days of surgery
- 5-year relative survival
 - Complete annual life tables by age, sex and SIMD
 - Deprivation gap
 - Estimated from absolute fitted difference between most and least deprived from linear regression model
 - Modelled using full-likelihood approach
 - Conditional analysis excluding post-operative deaths
- Chi-squared and logistic regression modelling



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Results

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		Total = 4,296 (%)
Age (years)	< 65	30
	65 – 74	34
	≥ 75	36
Sex	Male	54
	Female	46
Socioeconomic group*	Affluent	16
	Intermediate	55
	Deprived	29

- Baseline data by socioeconomic group
 - Age, sex and site of tumour were not associated with socioeconomic group

*Affluent = SIMD 1, Intermediate = SIMD 2 – 4, Deprived = SIMD 5

		Socioeconomic group *(%)			P-value†
		Affluent	Intermediate	Deprived	
Mode of presentation	Elective	80.5	78.1	76.5	0.033
	Emergency	19.5	21.9	23.5	

*Affluent = SIMD 1, Intermediate = SIMD 2 – 4, Deprived = SIMD 5;
†X² test across the original 5 SIMD categories

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		Affluent	Intermediate	Deprived	
Mode of presentation	Elective	80.5	78.1	76.5	0.033
	Emergency	19.5	21.9	23.5	
Previous inpatient bed-days	0	45.2	45.5	41.8	0.03
	1 - 7	36.5	34.1	34.2	
	8 – 28	14.8	15.2	16.3	
	>28	3.6	5.2	7.7	

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Dukes' stage	A	17.9	13.5	12.5	0.016
	B	32.9	32.1	33.0	
	C	28.6	29.7	30.1	
	D	17.9	20.7	19.2	
	Unknown	2.7	4.0	5.4	

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Intent of surgery	Curative resection	82.6	75.8	73.3	<0.001
	Palliative resection	14.5	19.1	20.0	
	Surgery, no resection	3.0	5.1	6.6	

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	Palliative resection	14.5	19.1	20.0	
	Surgery, no resection	3.0	5.1	6.6	
Speciality of surgeon	Specialist	72.0	73.1	76.3	0.001
	Non-specialist	28.0	26.9	23.7	

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†X² test across the original 5 SIMD categories

		Socioeconomic group *(%)			P-value†
		Affluent	Intermediate	Deprived	
Overall		4.2	6.8	9.6	<0.001

*Affluent = SIMD 1, Intermediate = SIMD 2 – 4, Deprived = SIMD 5;
†X² test across the original 5 SIMD categories

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Post-operative Mortality

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	Socioeconomic group *(%)			P-value†
	Affluent	Intermediate	Deprived	
Overall	4.2	6.8	9.6	<0.001
Elective surgery	2.8	4.1	5.4	0.113

*Affluent = SIMD 1, Intermediate = SIMD 2 – 4, Deprived = SIMD 5;
†X² test across the original 5 SIMD categories

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Post-operative Mortality

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	Socioeconomic group *(%)			P-value†
	Affluent	Intermediate	Deprived	
Overall	4.2	6.8	9.6	<0.001
Elective surgery	2.8	4.1	5.4	0.113
Emergency surgery	9.9	16.4	23.1	0.008

*Affluent = SIMD 1, Intermediate = SIMD 2 – 4, Deprived = SIMD 5;
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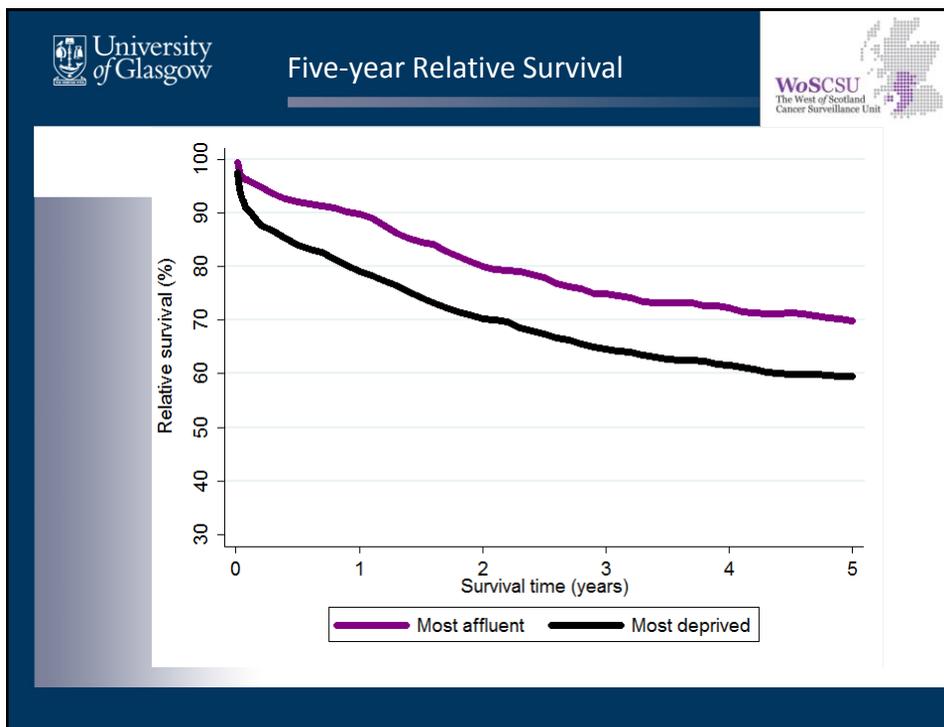
- Other factors associated with post-operative death – univariate analysis
 - Advancing age
 - Previous inpatient bed-days
 - Advancing Dukes' stage
 - Colon tumours
 - Non-curative surgery
 - Surgery by a non-specialist

Logistic multivariate model

		Hazard Ratio	95% CI	P-value
Socioeconomic group*	Affluent	1.00		
	Intermediate	1.50	(0.97, 2.30)	0.066
	Deprived	2.26	(1.45, 3.52)	<0.001

Adjusted for age, year of incidence,
sex, inpatient bed-days, mode of presentation, Dukes' stage, site of tumour,
intent of surgery and speciality of surgeon

*Affluent = SIMD 1, Intermediate = SIMD 2 – 4, Deprived = SIMD 5



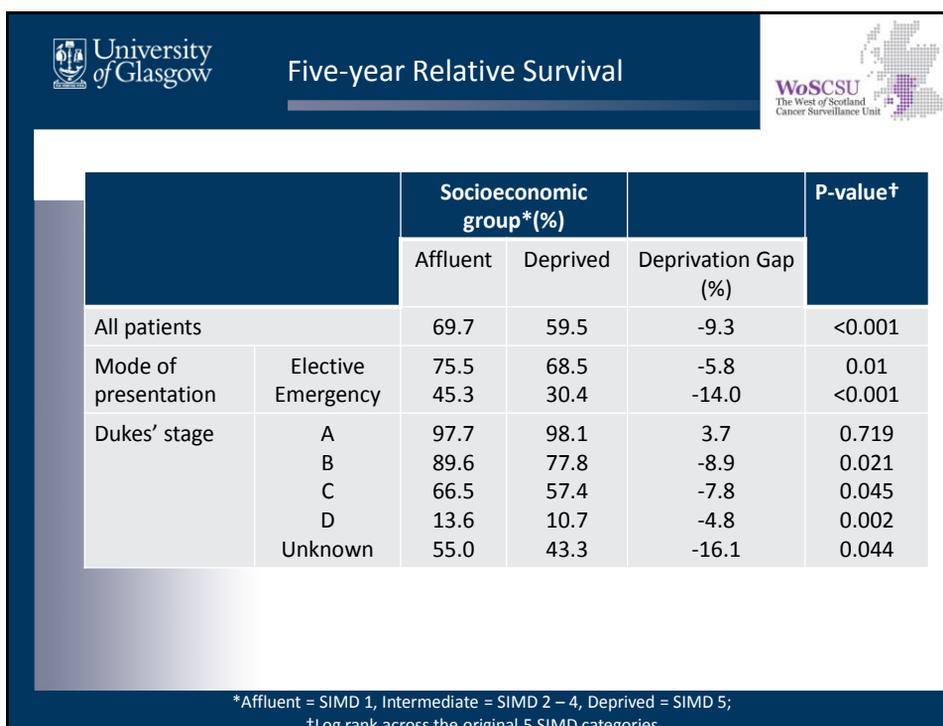
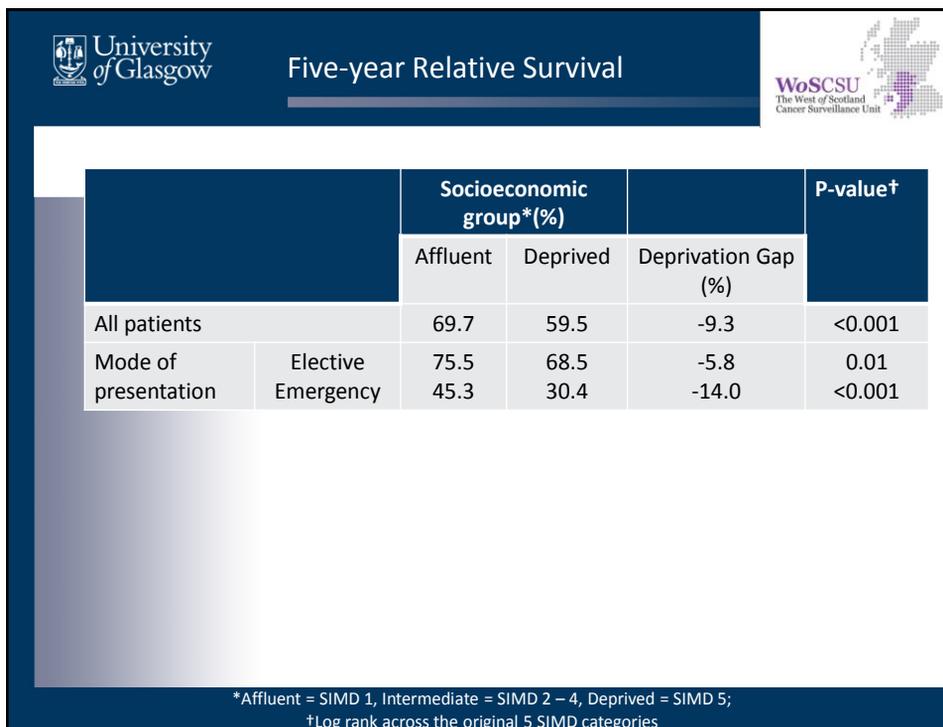
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Five-year Relative Survival

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	Socioeconomic group* (%)			P-value†
	Affluent	Deprived	Deprivation Gap (%)	
All patients	69.7	59.5	-9.3	<0.001

*Affluent = SIMD 1, Intermediate = SIMD 2 – 4, Deprived = SIMD 5;
†Log rank across the original 5 SIMD categories



- Other factors associated with poorer 5-year relative survival – univariate analysis
 - Advancing age
 - Previous inpatient bed-days
 - Colon tumours
 - Non-curative surgery
 - Surgery by a non-specialist

Multivariate model

	Socioeconomic group* Relative excess risk ratios (95% CI)			P-value†
	Affluent	Intermediate	Deprived	
Adjusted‡	1.00	1.22 (1.02, 1.46)	1.24 (1.03, 1.50)	0.016

‡Adjusted for age, year of incidence, sex, inpatient bed-days, mode of presentation, Dukes' stage, site of tumour, intent of surgery and speciality of surgeon;

*Affluent = SIMD 1, Intermediate = SIMD 2 – 4, Deprived = SIMD 5

†Test for trend across the original 5 SIMD groups

Univariate and multivariate models

	Socioeconomic group* Relative excess risk ratios (95% CI)			P-value†
	Affluent	Intermediate	Deprived	
Adjusted‡	1.00	1.22 (1.02, 1.46)	1.24 (1.03, 1.50)	0.016
Adjusted ‡& excluding post-operative deaths	1.00	1.16 (0.96, 1.41)	1.08 (0.87, 1.34)	0.469

‡Adjusted for age, year of incidence, sex, inpatient bed-days, mode of presentation, Dukes' stage, site of tumour, intent of surgery and speciality of surgeon;

*Affluent = SIMD 1, Intermediate = SIMD 2 – 4, Deprived = SIMD 5

†Test for trend across the original 5 SIMD groups

- Deprivation is independently associated with poorer survival following surgery for colorectal cancer
- The observed socioeconomic survival gradient occurs in the first few weeks after surgery
- When post-operative deaths are removed, no longer-term survival gradient was evident

- Early survival inequality between socioeconomic groups drives the observed deprivation gap in survival at 5-years
- Possible explanations
 - Co-morbidity
 - Smoking prevalence
 - Obesity
 - General wellness and physiological state

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