

Evidence tabel –Behandeling Chirurgie

Auteurs, jaartal	Mate van bewijs	Studie type Follow-up	Populatie (incl. steekproef-grootte)	Patienten kenmerken	Indextest (diagn. onderzoek)	Controle (referentie-test)	Resultaten	Conclusie	Opmerkingen																					
Subtotal vs. total																														
Bozzetti, 1997 and 1999 Italy	B	RCT Median FU 73 months	648 pts with gastric cancer in the distal half of the stomach (624 analysed)	313 (51%) <= 60 yrs and 199 (32%) > 65 yrs; 58% males Stage: 134 IA, 114 IB, 133 II, 133 IIIA, 112 IIB or IV, 2 undetermined	Total D2 gastrectomy including regional lymphadenectomy (n=304)	Subtotal D2 gastrectomy including regional lymphadenectomy (n=320)	<table border="1"> <tr> <td>Nonfatal complications</td> <td>Total</td> <td>Subtotal</td> </tr> <tr> <td>Surgical</td> <td>40/304 (13%)</td> <td>29/320 (9%)</td> </tr> <tr> <td>Non-surgical</td> <td>32/304</td> <td>25/320</td> </tr> <tr> <td>Fatal complications</td> <td>8/304</td> <td>4/320</td> </tr> <tr> <td>Deaths from all causes</td> <td>7/304 (2%)</td> <td>4/320 (1%)</td> </tr> <tr> <td>Non-surgical</td> <td>6/304</td> <td>1/320</td> </tr> <tr> <td></td> <td>1/304</td> <td>3/320</td> </tr> </table> <p>Odds ratio for postoperative events (95%CI) TG vs, SG is 1.59 (0.99-2.56) Five-yr survival; hazard rate ratio SG/TG 0.89 (95% CI 0.68, 1.17)</p>	Nonfatal complications	Total	Subtotal	Surgical	40/304 (13%)	29/320 (9%)	Non-surgical	32/304	25/320	Fatal complications	8/304	4/320	Deaths from all causes	7/304 (2%)	4/320 (1%)	Non-surgical	6/304	1/320		1/304	3/320	The data show that subtotal and total gastrectomies have a similar postoperative complication rate and surgical outcome	Concealment of allocation not clear; no ITT Regardless of the type of operation (SG or TG), an effort was made to maintain a distance exceeding 6 cm from the proximal edge of the tumor
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De Manzoni, 2003 Italy	B	Non-randomized clinical trial Median follow-up 39.7 months (range 14.5 to 105.6)	117 pts with proven primary gastric carcinoma, who had an advanced cancer invading the serosa (pT3) located in the gastric antrum and who underwent at least D2 lymphadenectomy	Mean age 66.3 (SD 11.9) yrs; 59% males Pt who underwent total gastrectomy had more positive nodes (11.3 (SD 11.0) vs 7.5 (SD 8.1), p=0.034)	Total gastrectomy (n=40)	Subtotal gastrectomy (n=77)	<table border="1"> <tr> <td>Cum 5 yr survival</td> <td>Total</td> <td>Subtotal</td> </tr> <tr> <td>Complications (total rate)</td> <td>22% (95% CI 11, 37)</td> <td>36% (95% CI 22, 50)</td> </tr> <tr> <td>Mortality</td> <td>15.0%</td> <td>14.3% (p=0.92)</td> </tr> <tr> <td></td> <td>5.0%</td> <td>1.3% (p=0.27)</td> </tr> </table> <p>RR of death from gastric cancer Surgery total vs subtotal RR (95% CI) 1.66 (0.99-2.78) Over 5 yrs, pts with subtotal gastrectomy had better disease-related survival (logrank test p=0.011)</p>	Cum 5 yr survival	Total	Subtotal	Complications (total rate)	22% (95% CI 11, 37)	36% (95% CI 22, 50)	Mortality	15.0%	14.3% (p=0.92)		5.0%	1.3% (p=0.27)	Survival after subtotal gastrectomy is not lower than that after total gastrectomy in patients with tumor of the antrum invading the serosa.	Not randomized Choice procedure based on preference surgeon									
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Gouzi, 1989 France	B	RCT	169 patients with a resectable carcinoma of the antrum	Age > 65 yrs=31% 63% males Serosal invasion S0=42% S+=58% Nodal extension N0=45% N+=55%	Total gastrectomy (n=76)	Subtotal gastrectomy (n=93)	<p>There was no difference in survival between patients of the SG and TG groups related to lymph node involvement and serosal extension. The rates of non-lethal complications were 32% for total and 34% for subtotal gastrectomy (p not given).</p> <p>5-yr survival rates with and without lymph node involvement were 18% and 69%, respectively (p < 0.001). 5-yr survival rates with and without serosal extension were 16% and 74%, respectively (p < 0.001).</p>	TG and SG can be performed safely in patients with adenocarcinoma of the antrum; however TG did not increase the survival rate.	Concealment of allocation and ITT not clear The proximal margin of clearance was 10 cm in TG, and 7.5 cm in SG.																					

Pancreaticosplenectomy											
Csendes, 2002 Chile	B	RCT	200 pts with gastric carcinoma confirmed by histologic analysis who underwent total gastrectomy (187 analysed)	Mean age 62 yrs (range 29-80) 70% males	Total gastrectomy with splenectomy (n=99)	Total gastrectomy (n=97)	Five-yr survival rate Septic complications Fever > 38°C Pulmonary Subphrenic abscess Wound infection Operative mortality Reoperations Hospital stay in days	Without splenectomy 36% 39% 24% 4% 11% 3% 9% 18.4	With splenectomy 42% (p>.05) 50% (p<.04) 39% (p<.008) 11% (p<.05) 18% 4% 10% 21.6 (p<.06)	Splenectomy has no effect on survival after total gastrectomy (in early stages), and therefore splenectomy can be avoided	Concealment of allocation not clear, no ITT
Yu, 2006 Korea	B	RCT	207 pts with endoscopic biopsy-proven gastric adenocarcinoma who underwent total gastrectomy	Median age 57 yrs (range 24-78) 70% males stage 18 IA, 47 IB, 45 II, 38 IIIA, 16 IIIB, 45 IV	Total gastrectomy with splenectomy (N=104)	Total gastrectomy without splenectomy (N=103)	Overall 5 yr survival Gastric cancer related deaths Major postoperative Complications	Without 48.8% N=51 8.7%	With 54.8% (logrank p=0.50) N=45 15.4%	The results do not support the use of prophylactic splenectomy to remove macroscopically negative lymph nodes near the spleen in patients undergoing total gastrectomy	Concealment of allocation not clear, no ITT
Wu, 2006 Wu 2006a Taiwan	B	Prospective cohort (based on RCT Wu 2004) FU: at least 5 yrs; 164 pts followed for at least 7 yrs	221 pts with histologically proven potentially curable gastric adenocarcinoma, who had physical fitness suitable for elective operation of either type of lymphadectomy	Median age 64 77% males 52 T1, 46 T2, 115 T3, 8 T4	Splenectomy N=4 Distal pancreatectomy (n=14)	No splenectomy (n=217) No distal pancreatectomy (n=207)	Risk of death was not found to be increased in those patients with spleen or both spleen and pancreas removed (multivariate HR 1.05 (95% CI 0.49, 2.26). Distal pancreatectomy negatively affected surgical morbidity (RR 6.21 95% CI 1.87, 20.63) and overall morbidity (RR 5.50 95%CI 1.67, 18.08).. All of the patients underwent concomitant splenectomy. The RR of splenectomy for surgical complications was 4.19 (95%CI 1.33, 13.21).	Splenectomy (with or without pancreatectomy) and nodal dissection are risk factors for operative morbidity but not mortality. However, the number of splenectomies was less than 10%	Cohort study design Low number of splenectomies and pancreatectomies		
Kodera, 2005 Japan	B	Prospective cohort study (based on RCT Sano 2004)	523 pts with histologically proven and resectable primary gastric carcinoma (263 patients underwent D2 260 patients underwent D3)	Median age 61 (range 25-75) 68% males Stage: 192 T2-SS, 30 T3, 22 T4	Lymph node dissection with splenectomy and/or pancreatectomy	Lymph node dissection without splenectomy and/or pancreatectomy	Pancreatectomy increased risk of overall complications (multivariate RR 5.62, 95% CI 1.94 to 16.27) and risk of major surgical complications (multivariate RR 6.90, 95%CI 1.86, 25.58) Splenectomy increased risk for overall complications in an univariate analysis (RR 2.11, 95%CI 1.41 3.17), this effect attenuated in a multivariate analysis (R 2.05, 95% CI 0.52, 8.01). Similar results were found for risk of major surgical complications (univariate RR 2.79, 95%CI 1.53, 5.09;	Pancreatic resection is an important risk factor for complication. Splenectomy was not an independent determinant of risk	Cohort study design Low number of pancreatectomies.		

			191 patients underwent splenectomy 22 patients underwent pan-createctomy				multivariate RR 1.08, 95%CI 0.15, 7.56)		
Hartgrink, 2004 The Netherlands	B	Prospective cohort study (based on RCT Hartgrink 2004)	711 pts with gastric adenocarcinoma with a curative resection Splenectomy=165 Pancreatectomy=108	Median age 66 yrs; 57% males Stage: 5 T0, 183 T1, 333 T2, 176 T3, 12 T4, 2 Tx	Lymph node dissection with splenectomy and/or pancreatectomy	Lymph node dissection without splenectomy and/or pancreatectomy	Patients who underwent splenectomy had an increased risk of morbidity (relative risk ratio 3.03 (95%CI 2.19, 4.19) and of mortality RR 2.67 (1.55, 4.62). Patients who underwent pancreatectomy had an increased risk of morbidity (RR 3.43 (2.49, 4.72) and of mortality RR 2.14 (1.17, 3.19).	Pancreatectomy increased risk of morbidity and mortality. So had splenectomy .	Cohort study design
Bozzetti, 1997, 1999	B	Prospective cohort study (based on RCT Bozzetti 1997)	648 pts with gastric cancer in the distal half of the stomach 73 patients underwent splenectomy, (without removal other organs)	313 (51%) <= 60 yrs and 199 (32%) > 65 yrs; 58% males Stage: 134 IA, 114 IB, 133 II, 133 IIIA, 112 IIB or IV, 2 undetermined	Total D2 gastrectomy including regional lymphadenectomy (n=304)	Subtotal D2 gastrectomy including regional lymphadenectomy (n=320)	Patients who underwent splenectomy had an increased risk of postoperative events (complications and deaths) (multivariate analysis RR 1.94 95%CI 1.07, 3.51) Time to death was decreased in patients who had spleen (with or without neighboring organs) removed (multivariate HR 1.55 95%CI 1.08, 2.23)	Splenectomy increases risk of postoperative events and is associated with a worse prognosis	Cohort study design
Lymphadenectomy									
D2 vs D1									
McCulloch, 2003	A1	Meta-analysis Search up to 2001	Studies that reported 5 year survival or postoperative mortality rates, clearly defined the node dissection performed	15 studies, , on pts receiving D1 or D2 dissection 2 RCTs, 2 CTs and 11 cohort studies	Extended lymph node dissection (D2) during gastrectomy	Limited lymph node dissection (D1) during gastrectomy	Results of 2 RCTs: 5-yr survival: RR 0.95 (95% CI 0.83, 1.09) Postoperative mortality: RR 2.23 (1.45, 3.45) Results of 2 non-randomized trials Survival: RR 0.92 (0.83, 1.02) Postoperative mortality: RR 0.65 (0.45, 0.93)	D2 dissection carries increased mortality risks associated with spleen and pancreas resection, and probably with inexperience and low case volumes. Randomised studies show no evidence of overall survival benefit	Surgeons compliance and limited experience are problems Pts with tumors in cardia were included
Hartgrink 2004	A2	RCT Median FU	711 pts with gastric adenocarcinoma	Median age 66 yrs; 57% males	D2 lymph node dissection	D1 lymph node dissection	At 11 yrs, survival rates are 30% for D1 and 35% for D2 (logrank test p=0.53). The risk for relapse is 70% for D1 and 65% for D2 (logrank test p=0.43).	No improved survival or decreased	

The Netherlands		11 yrs (range 6.8 to 13.1)	with a curative resection with D1 or D2 lymph node dissection (subgroup of trial)	Stage: 5 T0, 183 T1, 333 T2, 176 T3, 12 T4, 2 Tx	Acc to Japanese Research Society for the Study of Gastric Cancer 331 analysed	380 analyzed	In univariate analysis, none of the subgroups based on selected prognostic variables had impact on survival rates between D1 and D2.			relapse rates can be obtained by D2 dissection	
Kasakura, 2002 Japan	B	Retrospective cohort study	1403 pts who underwent resection between 1980 and 1997	Mean age 59.4 in limited and 56.4 in extended group. 70% males Stage: 822 I, 329 II, 299 III, 53 IV:	D2 dissection with gastrectomy (n=412)	D1 dissection with gastrectomy (n=991)	There was no significant difference in overall patient survival (data presented as figure only) However, in the patients with stage II, T1 or T2 or n1 disease, the survival of the D2 group was better compared to that of the D1 group.(p<0.05).			Metastatic lymph nodes should be resected as far as possible. D2 dissection with gastrectomy is recommended for T1N1 or T2N1 disease	Cohort study design
Edwards, 2004 UK	B	Controlled clinical trial	118 pts with potential curative carcinoma of the stomach	Age range 27-93; 66% males Stage: 28 I, 32 II, 31 IIIA, 27 IIIB	Modified D2 gastrectomy (preserving pancreas and spleen) (n=82)	D1 gastrectomy (n=36)	Operative mortality	D2	D1	Modified D2 gastrectomy can improve survival 4-fold for patients with stage III cancer, without significantly increasing morbidity and mortality when compared with a D1 gastrectomy	Not randomized
							5-yr survival	7.3%	8.3% (p=0.8)		
							Survival of patients with stage III cancer	59%	32% (p=0.039)		
								33%	8% (p=0.011)		
Extended D2 vs standard D2											
Sano, 2004 Japan	A2	RCT	523 pts with potentially curable gastric adenocarcinoma (T2-subserosa, T3, or T4) who were surgically fit, <75 yrs	Median age 61 (range 25-75); 68% males Stage: 192 T2-SS, 30 T3, 22 T4	D2 combined with para-aortic lymphadenectomy (n=260)	D2 lymphadenectomy (n=263)	Complications Any complication	D2+ 28.1%	D2 20.9% (p=.067)	Para-aortic lymphadenectomy could be added without increasing major surgical complications	Surgeons had 'sufficient' (not defined) experience
							Anastomotic leak Pancreatic fistula Abdominal abscess Pneumonia Others	1.9% 6.2% 5.8% 1.5% 20.0%	2.3% (p=0.99) 5.3% (p=0.71) 5.3% (p=0.85) 4.6% (p=0.72) 9.1% (p<.001)		
							Reoperation Hospital death	2.7% 0.8%	1.9% (p=0.57) 0.8% (p=0.99)		
Kulig, 2007 Poland	A2	RCT	275 pts, with histologically proven gastric adenocarcinoma who qualified for gastric resection	Median age 55 yrs (range 31-81); 61% males	Extended D2 lymphadenectomy (additional removal of para-aortic nodes) (n=134)	Standard D2 lymphadenectomy (according to JGCA, removal of node groups 1-12) (n=141)	Results extended vs standard D2 Overall morbidity: 21.6% (95% CI 13.7, 29.5) vs 27.7% (20.3, 35.1) Surgical complications: 11.9% vs 15.6% Non-surgical complications: 14.9% vs 19.9% Relaparotomy: 9.7% vs 11.3% Postoperative mortality: 2.2% (95% CI 0, 4.7) vs 4.9 (1.4, 8.5)			The surgical outcome was not different between the 2 surgeries	
Marubini 2002	B	Prospective cohort study	615 pts subjected to a	Age: 313 <=60 yrs 106 61-65 yrs and	Number of resected	No control group	There were 227 deaths. There was no difference among the subgroups of patients with different lymphadenectomy			A lymphadenectomy	Cohort study design

Italy		(based on RCT Bozzetti)	curative (R0) subtotal or total gastrectomy	196 >65 staging: 134 IA, 103 IB, 133 IIA, 133 IIIA, 112 IIIB-IV	lymph nodes		extents (<=15 nodes 1.82%, 16-25 nodes 1.80%; >=25 nodes 1.75%) The risk of long-term death for all causes tended to decrease with increasing number of resected lymph nodes up to about 25, and then could be considered stable for wide lymphadenectomies. An increasing risk of death for all causes was associated with an increasing number of metastatic lymph nodes; the risk could be considered stable for more than 20 metastatic lymph nodes.	including more than 25 lymph nodes is suggested, provided that there is a low risk of operative mortality	
D3 vs D1 dissection									
Wu, 2006 Taiwan	A2	RCT FU: at least 5 yrs; 164 pts followed for at least 7 yrs	221 pts with histologically proven potentially curable gastric adenocarcinoma, who had physical fitness suitable for elective operation of either type of lymphadectomy	Median age 64 77% males 52 T1, 46 T2, 115 T3, 8 T4	D3 (ie, levels 1, 2, and 3) lymphadenectomy (N=111) All surgeons had done at least 25 of such procedures	D1 (ie, level 1) lymphadenectomy (n=110)	Five-yr overall survival was 59.5% for D3 and 53.6% for D1 (difference between groups 5.9% (95% CI -7.3, 19.1). Adjusted HR 0.49 (0.32, 0.77) Five-yr disease-specific survival 63.1% for D3 and 57.8% for D1 (difference between groups 5.3% (-7.8, 18.4). Adjusted HR 0.72 (0.57, 0.91) Pts who had R0 resection in the D3 group had higher 5-yr overall survival compared to D1 (diff 6.9% (-6.3, 20.7). Adjusted HR 0.46 (0.30, 0.72). Also a higher 5-yr disease-specific survival was found (diff 6.4% (-7.0, 19.7). Adjusted HR 0.69 (0.54, 0.88) Recurrence at 5 yrs was 50.6% for D1 and 40.3% for D3 (difference between groups 10.3% (-3.2, 23.7). Adjusted HR 0.65 (0.41, 1.02) Multivariate analysis showed that nodal disease, a tumour in the whole stomach, Borrmann type III and IV appearance, and allocation to D1 surgery was associated with poor survival.	D3 nodal dissection, compared with that of D1, offers a survival benefit for patients with gastric cancer when done by well trained, experienced surgeons	
D3 vs D2 dissection									
Kunisaki, 2006 Japan	B	Retrospective cohort study	580 pts with primary advanced gastric adenocarcinoma, histologically confirmed as having a depth of invasion deeper than the subserosa and underwent potentially curative gastrectomy between 1992 and 2000	Mean age 62.2 (SD 12.5) for D2 and 59.3 (10.7) for D3; 68% males depth of invasion: 268 T2, 284 T3, 28 T4	D3 gastrectomy (n=150)	D2 gastrectomy (n=430)	The incidence of pulmonary disorders and of renal dysfunction was higher in the D3 group (p<.001 and p=0.0014 respectively). There was no difference in overall survival between the D2 and D3 groups (5 yr survival 56.0 vs 50.4%, resp.) and in disease-specific survival (58.8% vs 54.0% resp.) Overall recurrence occurred in 247 patients; 172 in D2 and 75 in D3. This difference was not significant.	No differences were found in survival and recurrence between the groups. Postoperative morbidity was increased in the D3 group.	Not randomized

D4 vs D3 dissection											
Maeta, 1999 Japan	B	Non-randomized controlled trial Med FU Group A and B: 26 and 30 mo, resp.	70 pts with T3 or T4 gastric cancer and without macroscopic metastasis to the para-aortic nodes treated by potentially curative total gastrectomy	Mean age A 59 (SD 9), B 60 (11); 59% males Stage: 4 I, 22 II, 33 III, 11 IV	Super-extended lymphadenectomy D4 (n=35)	Extended lymphadenectomy D3 (n=35)	Results D3 vs D4 Operative death: 1 (3%) vs 1 (3%) (ns) Total morbidity: 14 (40%) vs 9 (26%) (ns) Cumulative survival: no difference between groups (p=0.42)			No difference between operative mortality and morbidity and cumulative survival was found between the two procedures.	Not randomized
Overig											
Huscher, 2005 Italy	B	RCT	70 pts with a preoperative diagnosis of distal gastric cancer were considered for subtotal gastrectomy (59 analysed)	Open group: mean age 63.6 (SD 13.2 yrs); 72% males Laparoscopic group: mean age 63.2 (12.5) yrs; 60% males	Laparoscopic subtotal gastrectomy (n=30) Experienced laparoscopic surgeon	Open subtotal gastrectomy (n=29)	Postoperative morbidity mortality Disease recurrence 5-yr survival Disease free survival	Open subtotal 27.6% 6.7% 37.0% 55.7% 54.8%	Laparoscopic 26.7% (ns) 3.3% (ns) 37.9% (ns) 58.9% (ns) 57.3% ns)	Laparoscopic radical subtotal gastrectomy for distal gastric cancer is a feasible and safe oncologic procedure with similar results to those obtained with an open approach	Small sample size; no ITT No p-values were given
Lehnert, 2004	B	Systematic review	Prospective randomized and controlled trials studying reconstruction after total gastrectomy for gastric malignancy	19 RCT's including a total of 866 patients	Different reconstruction surgery after total gastrectomy	-	The operative risk of total gastrectomy was low, with a median mortality rate of 0% (range 0-22), irrespective of the method of reconstruction. Neither gastric substitution nor restoration of duodenal transit was associated with significant procedure-related complications. Results for specific reconstructions varied considerably within and between studies. Jejunal pouch reconstruction, but not restoration of duodenal passage, was associated with improved food intake and the tendency for weight gain in the early postoperative months. A favorable perception of quality of life persisted in the long term in some studies. Only 2 trials accrued 30 or more patients per study arm and therefore the power of any individual trial was limited. Most studies selected different endpoints and measures to describe variables rendering a formal meta-analysis impossible. -			Construction of a small-bowel reservoir after total gastrectomy should be considered to improve early postoperative eating capacity, bodyweight and quality of life.	Methods of review poorly described. Results summarized qualitatively

Volume

Auteurs, jaartal	Mate* van bewijs	Studie type	Populatie (incl. steekproef-grootte)	Patiënten kenmerken	Hospital or surgeon volume	Resultaten	Conclusie	Opmerkingen
Burgers, 2007	B	Systematic review	Articles reporting on association between quality of care and volume per hospital or volume per surgeon	55 studies	Hospital and surgeon	3 studies reported on the level of the surgeon, all reported that a high volume was associated with better results. 5 studies reported on the level of the hospital; three reported that a high volume yielded better results whereas two could not confirm such results.	There appears to be a relatively weak association between volume of hospital and surgeon in relation to the quality of care.	
Halm, 2002	B	Systematic review	Population-based studies examining the relationship between hospital or physician volume and clinical outcomes	135 articles, of which 3 reported on gastric cancer	Hospital and surgeon	<p>Range of Time Periods Studied: 1986-97</p> <p>Hospital volume (n=3) Low volume: median 10 cases per yr (range 5-15) High volume: median 63 cases per yr (range 15-201) Median average mortality rate (range): 10.9 (6.2 - 12.2) Median absolute difference in mortality rate for high vs. low volume (range): 6.5 (4.0-7.1)</p> <p>Physician volume (n=2) Low volume: median 1 and 2 per yr High volume: 2 and 12 cases per yr Median average mortality rate (range): 6.2 and 12.2 Median absolute difference in mortality rate for high vs. low volume (range): 4.0 and 5.7</p>	High volume is associated with better outcomes across a wide range of procedures and conditions, but the magnitude of the association varies greatly	Results presented for gastric cancer only.
Individual studies included in the systematic review of Burger 2007								
Bachmann, 2002 UK	B	Retrospective cohort study	1512 pts with histological evidence of oesophageal or gastric cancer. Of these, 731 had gastric cancer	-	Hospital Surgeon	The operative mortality decreased by 41% (adjusted OR 0.59 95% CI 0.32, 1.07) for each increase of 10 patients in doctors' annual surgical caseloads. The risk of death decreased by 7% (adjusted HR 0.93 95%CI 0.89, 0.98) for each increase of 10 patients in hospitals' annual caseloads.	The study supports concentration of services. Specialization of doctors and their teams is at least important as specializations of hospitals	Retrospective design
Damhuis, 2002 The Netherlands	B	Retrospective cohort study	1978 pts undergoing resection for gastric cancer in the period 1987-97 in 22 hospitals	-	Hospital	<p>Operative mortality in categories based on volume (resections per year)</p> <p><7 resections: 8.0% 7-10 resections: 9.8% >10: resections 6.8% (p=0.21)</p> <p>Volume had a small influence in multivariate analysis (P=0.06) which disappeared after exclusion of one of the hospitals (hospital V)</p>	Variation in postoperative mortality between hospitals was large but not related to hospital volume.	Retrospective design The predominance of low-volume hospitals may account for finding no relation between volume and postoperative mortality
Finlayson, 2003 USA	B	Retrospective cohort study	>195 000 patients in database; 16081	-	Hospital	<p>Hospital volume <9/yr 9-17/yr</p> <p>Operative mortality 8.7% 7.4%</p>	A trend for a decreased risk of death in high	Retrospective design

			gastric cancer patients in 911 hospitals (1995-1997)			>17/yr	6.9% Adjusted OR for risk of death at high-volume compared to low-volume hospitals approx 0.95 (95% CI 0.7, 1.2) (data read off fig)	volume hospitals was found, however this was not significant.	
Nomura, 2003 Japan	B	Retrospective cohort study	28,608 patients who underwent surgery for stomach cancer during 1975-1994 in 296 hospitals	-	Hospital	Cancer cases confined to stomach Annual hospital volume Very low (1-84) Low (96-223) Medium (231-421) High (487-644)	Mortality (HR) 1.5 (1.2, 1.9) 1.2 (0.9, 1.4) 0.9 (0.7, 1.1) 1.0	Positive relationships were seen between hospital volume and 5-year survival only for the very low volume hospitals	Retrospective design Results were presented for several subgroups based on time and extent of disease. Only results for most recent period were presented here (1990-94)
Hannan, 2002 USA	B	Retrospective cohort study	3711 patients who underwent a gastrectomy for cancer in 207 hospitals	-	Hospital and surgeon	Volume hospital 1-15 16-33 34-62 >63	Mortality rate 11.16 6.74 4.1 2.85	Risk adj rate* +7.10 (<0.0001) +3.03 (.10) +0.80 (.69) 0	* relative to fourth quartile (p-value) Retrospective design Volumes refer to the years 1998-2001
Callahan 2003 USA	B	Retrospective cohort study	6434 in-patients who underwent gastrectomy in 213 hospitals between 1998-2001	-	Hospital and surgeon	Hospital volume 1-27 28-54 55-140 141+	Mortality rate 11.3 11.5 7.0 3.7	Adj OR (95% CI) 2.34 (1.40, 3.90) 2.53 (1.47, 4.34) 1.63 (0.94, 2.83) 1 (ref)	Retrospective design Volumes refer to the years 1998-2001
Birkmeyer 2002 USA	B	Retrospective cohort study	2.5 million Medicare pts undergoing a cancer-related procedure Approx 12,000 pts had a gastrectomy	-	Hospital	Hospital volume Very low (<5/yr) Low (5-8/yr) Medium (9-13/yr) High (14-21/yr) Very high (>21/yr)	Mortality rate 13.0 12.7 11.1 11. 8.7	Adj OR 1.0 1.01 (0.9, 1.13) 0.88 (0.79, 0.99) 0.90 (0.80, 1.01) 0.72 (0.63, 0.83)	Medicare patient can reduce their risk of operative death by selecting a high-volume hospital Retrospective design