Preoperative tests (update)

Routine preoperative tests for elective surgery

NICE guideline NG45 Appendix J: Forest plots April 2016

> Developed by the National Guideline Centre, hosted by the Royal College of Physicians

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Contents

Appendix J: Forest plots

J.1 Resting electrocardiography (ECG)

See Section 5.7.1 of the full guideline for evidence statements.

Figure 1: Prolonged QTc interval as a predictor of perioperative cardiovascular events

			Odds Ratio			Odd	s Ratio			
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI			IV, Fix	ed, 95% C	I		
Biteker 2012	0.0421	0.0074	1.04 [1.03, 1.06]			1	ł			
				0.1	0.2	0.5	1 :	2 5	5	10
					Favou	irs normal QTo	Favours	s prolonged (QTc	

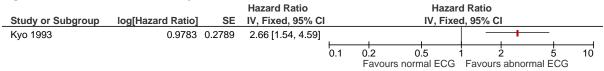
Figure 2: Abnormal ECG as a predictor of post-operative complications

			Odds Ratio			Odds	Ratio		
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI			IV, Fixe	d, 95% Cl		
Fritsch 2012	1.0346	0.371	2.81 [1.36, 5.82]					-	
				0.1	0.2	0.5	1 2	2 5	10
					Favour	s normal ECG	Favours	abnormal EC	G

Figure 3: Abnormal ECG as a predictor of one-year mortality

Study or Subgroup	log[Risk Ratio] SE	Risk Ratio			Ris IV. Fiz	sk Rat			
Study or Subgroup		IV, Fixed, 95% CI			IV, FD	(eu, 9	5% CI		
Koike 1999	0.4318 0.2465	1.54 [0.95, 2.50]				+	- <u> </u>		
						_			
			0.1	0.2	0.5	1	Ż	5	10
				Favour	s normal ECO	G Fa	vours abno	mal ECG	

Figure 4: Abnormal ECG as a predictor of survival rate



inguit J. Ji segi	nent acpression	1 43 4 1		118-0	crim Su	VIVal			
			Hazard Ratio			Haza	rd Ratio		
Study or Subgroup	log[Hazard Ratio]	SE	IV, Fixed, 95% CI			IV, Fixe	ed, 95% C	I	
Landesberg 2007	0.6627	0.1381	1.94 [1.48, 2.54]					<u> </u>	
				0.1	0.2	0.5	1 :	2 5	10
					Favour	s normal ECG	Favours	ST depression	n

Figure 5: ST segment depression as a predictor of long-term survival

Figure 6: Abnormal ECG as a predictor of post-operative cardiac complications

C	•	Odds Ratio		Odds	Ratio		
Study or Subgroup	log[Odds Ratio] SE	IV, Fixed, 95% CI		IV, Fixe	d, 95% Cl		
Liu 2002	-0.462 0.4137	0.63 [0.28, 1.42]	. —		<u> </u>	1	
		0.1	0.2	0.5	1 2	5	10
			Favours r	normal ECG	Favours ab	normal ECG	

Figure 7: Left bundle branch block as a predictor of post-operative myocardial infarction

-		-	Odds Ratio	-		Odds	Ratio			
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI			IV, Fixe	d, 95% C	I		
Vankle 2007	1.1314	0.5773	3.10 [1.00, 9.61]					-		
				0.1	0.2	0.5	1 2	5	5	10
				F	avours i	normal ECG	Favours	s LBBB		

Figure 8: Right bundle branch block as a predictor of post-operative myocardial infarction

•			Odds Ratio		•	Odds	Ratio		
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI			IV, Fixe	d, 95% Cl		
Vankle 2007	0.7419	0.3785	2.10 [1.00, 4.41]				I		
				0.1	0.2	0.5	1 2	5	10
				Fa	avours	normal ECG	Favours F	RBBB	

Figure 9: Left bundle branch block as a predictor of death during admission

0		•	Odds Ratio		0	Od	ds Rat	tio		
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI			IV, Fiz	ked, 95	5% CI		
Vankle 2007	1.2528	0.5053	3.50 [1.30, 9.42]				-		-	
				0.1	0.2	0.5	1	2	5	10
				F	avours	normal EC	G Fa	vours L	BBB	

J.2 Resting echocardiography

See Section 6.5.1 of the full guideline for evidence statements.

Figure 10: 30-day mortality

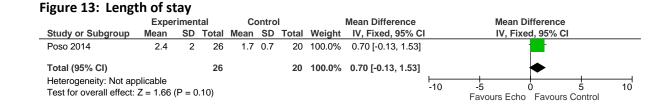
Study or Subgroup	log[Risk Ratio]	SE	Resting echo Total		Weight	Risk Ratio IV, Fixed, 95% CI			k Ratio ed, 95%			
Wijeysundera 2011	0.131	0.0567	35498	35498	100.0%	1.14 [1.02, 1.27]				_		
Total (95% Cl)			35498	35498	100.0%	1.14 [1.02, 1.27]				•		
Heterogeneity: Not ap Test for overall effect:)					0.5	0.7 Favours ech	1 o Favo	1 urs co	.5 ontrol	2

Figure 11: Length of hospital stay

Study or Subgroup	Mean Difference	SE	Resting echo Total		Weight	Mean Difference IV, Fixed, 95% CI	Mean Difference CI IV, Fixed, 95% CI
Wijeysundera 2011	0.31	0.0714	35498	35498	100.0%	0.31 [0.17, 0.45]] -
Total (95% CI) Heterogeneity: Not ap Test for overall effect:		1)	35498	35498	100.0%	0.31 [0.17, 0.45]	I -1 -0.5 0 0.5 1 Favours echo Favours control

Figure 12: Surgical site infection

			Resting echo	Control		Risk Ratio			Risk	Ratio			
Study or Subgroup	log[Risk Ratio]	SE	Total	Total	Weight	IV, Fixed, 95% CI			V, Fixe	d, 95%	CI		
Wijeysundera 2011	0.0296	0.0254	35498	35498	100.0%	1.03 [0.98, 1.08]							
Total (95% CI)			35498	35498	100.0%	1.03 [0.98, 1.08]							
Heterogeneity: Not ap Test for overall effect:)				-	0.).85 's echo	1 1 Favou	l .2 rs con	1. 1.	5



J.3 Cardiopulmonary exercise testing (CPET)

See Section 7.7.1 of the full guideline for evidence statements.

J.3.1 Intervention review

Open AAA surgery

Figure 14: 30-day mortality

	CPE	Т	contr	ol		Risk Ratio		Risk R	atio		
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% CI	I	M-H, Fixed	l, 95% Cl		
Goodyear 2013	4	100	13	103	100.0%	0.32 [0.11, 0.94]					
Total (95% CI)		100		103	100.0%	0.32 [0.11, 0.94]					
Total events	4		13								
Heterogeneity: Not ap Test for overall effect:		P = 0.0	4)				•••	0.5 1 rs CPET 1	2 Favours co	5 ontrol	10

EVAR AAA surgery

Figure 15: 30-day mortality

	CPE	Т	contr	ol		Peto Odds Ratio	Peto Odds Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	Peto, Fixed, 95% CI	Peto, Fixed, 95% Cl
Goodyear 2013	1	69	0	25	100.0%	3.91 [0.05, 329.71]	<
Total (95% CI)		69		25	100.0%	3.91 [0.05, 329.71]	
Total events	1		0				
Heterogeneity: Not app Test for overall effect:		P = 0.5	5)				Image: https://www.sciencescondition.com/sciencesconditicescondition.com/sciencescondition.com/sciencescondition.co

J.3.2 Prognostic review

J.3.2.1 Abdominal aortic aneurysm (AAA) repair surgery

J.3.2.1.1 Anaerobic threshold (AT)

Figure 16: 30-day mortality

			Odds Ratio			Odd	ls Rat	io		
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI			IV, Fix	ed, 95	% CI		
Hartley 2012	1.8485	0.632	6.35 [1.84, 21.92]						. 1	<u> </u>
				0.1	0.2	0.5	1	2	5	10
					Favou	urs AT < 10.	2 Fav	ours AT	> 10.2	

Figure 17: Survival at 35 months

			Hazard Ratio	Hazard Ratio	
Study or Subgroup	log[Hazard Ratio]	SE	IV, Fixed, 95% CI	IV, Fixed, 95% CI	
1.8.1 AT (threshold n	ot defined)				
Carlisle 2007	-0.1744	0.07	0.84 [0.73, 0.96]	+	
				0.1 0.2 0.5 1 2 Favours higher AT Favours lo	5 10 werAT

Figure 18: Cardiac complications

			Odds Ratio		Odds	s Ratio		
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI		IV, Fixe	d, 95% Cl		
1.9.1 Anaerobic three	shold (not defined)							
Barakat 2015	-0.5978	0.2023	0.55 [0.37, 0.82]					
				0.1	0.2 0.5 Favour higher AT	1 2 Favours lowe	5 r AT	10

Figure 19: Respiratory complications

			Odds Ratio			Odds	Ratio		
Study or Subgroup	log[Odds Ratio] S	SΕ	IV, Fixed, 95% CI			IV, Fixed	d, 95% CI		
1.16.1 Anaerobic thre	shold (not defined)								
Barakat 2015	-0.1625 0.16	51	0.85 [0.62, 1.17]			-+	<u> </u>		
				0.1	0.2	0.5			10
				0.1	··	ours higher AT	Favours lo	ower AT	10

Figure 20: Major complications

			Odds Ratio		Odds	Ratio		
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI		IV, Fixe	d, 95% Cl		
1.20.1 Anaerobic thre	shold (not defined))						
Prentis 2012	-0.3425	0.1121	0.71 [0.57, 0.88]					
				0.1	0.2 0.5 Favours higher AT	1 2 Favours lower	5 AT	10

J.3.2.1.2 VO₂

Figure 21: 90-day mortality

		Odds Ratio			Ode	ds Rat	tio		
Study or Subgroup	log[Odds Ratio] SE	IV, Fixed, 95% Cl			IV, Fix	ked, 95	5% CI		
Hartley 2012	2.1506 0.6657	8.59 [2.33, 31.67]							→
			⊢ 0.1	0.2	0.5	1	2	5	10
				Favours	peak VO2 < 1	5 Fav	vours peak \	VO2 > 15	

Figure 22: 3-year survival

			Hazard Ratio		Ha	azaro	Ratio	
Study or Subgroup	log[Hazard Ratio]	SE	IV, Fixed, 95% CI		IV, F	Fixed	l, 95% Cl	
Grant 2015	0.5164	0.2625	1.68 [1.00, 2.80]					
				0.01	0.1	1	10	100
					Favours peak VO2 <15ml/kg/r	nin	Favours peak VO2 >15ml	l/kg/min

Figure 23: Cardiac complications

			Odds Ratio	Odds Ratio
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% Cl	IV, Fixed, 95% CI
1.12.2 Peak VO2 (three	eshold not defined)			
Barakat 2015	0.0296 0	0.1226	1.03 [0.81, 1.31]	+
				0.1 0.2 0.5 1 2 5 10
				Favours higher VO2 Favours lower VO2

Figure 24: Pulmonary complications

			Odds Ratio	Odds Ratio
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% C	IV, Fixed, 95% CI
1.19.1 Peak VO2 (three	shold not defined)		
Barakat 2015	-0.1165	0.1299	0.89 [0.69, 1.15]	-+-
				0.1 0.2 0.5 1 2 5 10 Favours higher VO2 Favours lower VO2

J.3.2.1.3 VE/VCO2

Figure 25: Survival at 35 months Hazard Ratio Hazard Ratio Study or Subgroup log[Hazard Ratio] SE IV, Fixed, 95% CI IV, Fixed, 95% CI 1.7.1 VE/VCO2 (unclear threshold) t Carlisle 2007 0.1222 0.03 1.13 [1.07, 1.20] 0.1 0.2 0.5 2 5 1 11 Favours higher VE/VCO2 Favours lower VE/VCO2

Figure 26: 3-year survival

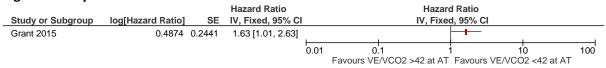


Figure 27: Cardiac complications

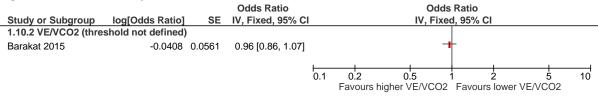
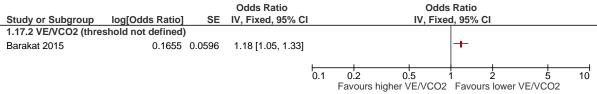


Figure 28: Respiratory complications



J.3.2.2 Lung resection surgery

J.3.2.2.1 VO₂

Complications

Figure 29: Pulmonary complications

			Odds Ratio			Odd	s Ratio			
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI			IV, Fixe	ed, 95% C	1		
6.3.1 Peak VO2 (unc	lear threshold)									
Brunelli 2009	-0.1393	0.0659	0.87 [0.76, 0.99]			-	H			
Licker 2011	-0.1752	0.059	0.84 [0.75, 0.94]			-	-			
				0.1 0	0.2	0.5	1 :	2 :	5	1
				Favour	rs higher	peak VO	2 Favour	s lower pe	ak١	/02

Figure 30: Cardiovascular complications

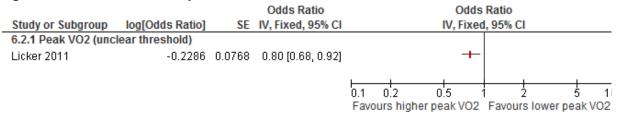


Figure 31: All complications

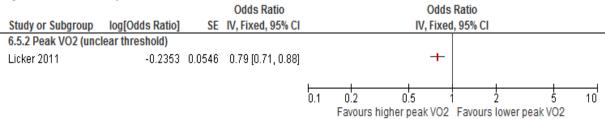


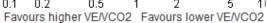
Figure 32: Cardiopulmonary complications

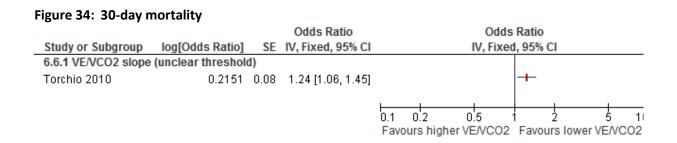
			Odds Ratio	Odds	Ratio
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI	IV, Fixed	I, 95% CI
6.1.1 Peak VO2 (unc	lear threshold)				
Torchio 2010	-2.9957	0.8212	0.05 [0.01, 0.25]	← +	
				I	
				0.01 0.1 1	i 1'0 100'
				Favours higher peak VO2	Favours lower peak VO2

J.3.2.2.2 VE/VCO₂ slope

Figure 33: Respiratory complications

			Odds Ratio			Odds	Ratio			
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI			IV, Fixed	l, 95% C	I		
6.4.1 VE/VCO2 slope	(uncelar threshold)									
Brunelli 2012	0.09 0	.03	1.09 [1.03, 1.16]				ł			
				0	ار ا	ا	ļ)	<u></u>	1

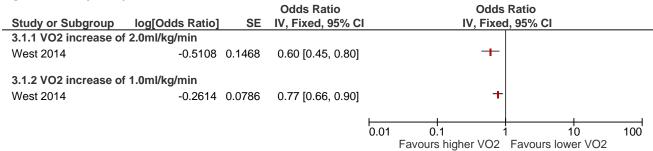




J.3.2.3 Major colonic surgery

Peak VO₂

Figure 35: Any complication



J.3.2.4 Pancreaticoduodenectomy

J.3.2.4.1 Anaerobic threshold

Figure 36: In hospital mortality

Study or Subgroup	log[Odds Ratio]	SE	Odds Ratio IV, Fixed, 95% Cl	Odds Ratio IV, Fixed, 95% Cl
11.1.1 AT ≤ 10.1 ml/	kg/min			
Ausania 2012	0.2744	1.1457	1.32 [0.14, 12.43]	
11.1.2 AT threshold r Junejo 2014	not defined -0.1054	0.2799	0.90 (0.52, 1.56)	_+_
				0.01 0.1 1 10 100 Favours lower AT Favours higher AT

Figure 37: Cardiorespiratory complications

		Odds Ratio	Odds Ratio	
log[Odds Ratio]	SE	IV, Fixed, 95% CI	IV, Fixed, 95% CI	
/kg/min				
1.0586	0.7543	2.88 [0.66, 12.64]	- + - +	
				1
				-
	/kg/min	/kg/min	log[Odds Ratio] SE IV, Fixed, 95% CI /kg/min	log[Odds Ratio] SE IV, Fixed, 95% Cl IV, Fixed, 95% Cl

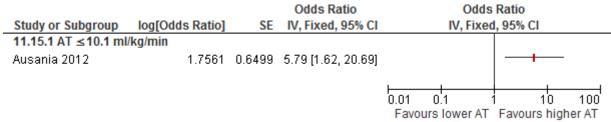
Figure 38: Cardiopulmonary complications

			Odds Ratio	Odds Ratio
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI	IV, Fixed, 95% CI
11.11.2 AT threshold	not defined			
Junejo 2014	0.0488	0.1261	1.05 [0.82, 1.34]	+
				Favours lower AT Favours higher AT

Figure 39: All complications

			Odds Ratio	Odds Ratio
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI	IV, Fixed, 95% CI
11.7.1 AT ≤ 10.1 ml/	kg/min			
Ausania 2012	1.3173	0.5279	3.73 [1.33, 10.51]	
11.7.2 AT threshold r	not defined			
Junejo 2014	0.0677	0.1296	1.07 [0.83, 1.38]	-+
				0.1 0.2 0.5 1 2 5 10 Favours lower AT Favours higher AT

Figure 40: Pancreatic Leak



J.3.2.4.2 VO₂

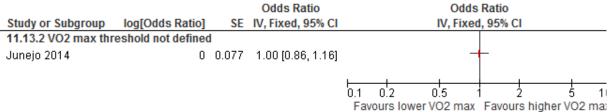
Figure 41: In-hospital mortality

			Odds Ratio	Odds Ratio
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI	IV, Fixed, 95% CI
11.3.2 VO2 max thre	shold not defined			
Junejo 2014	0.0296	0.1484	1.03 [0.77, 1.38]	_ _
				Favours lower VO2 max Favours higher VO2 max

Figure 42: 30-day mortality

			Odds Ratio		Odds	Ratio		
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI	IV, Fixed, 95% CI				
11.6.2 VO2 max thre	shold not defined							
Junejo 2014	0.2776	0.1898	1.32 [0.91, 1.91]		-			
					0.5		<u></u>	10
				0.1 0.2	ver VO2 max	Favours hig	-	· •

Figure 43: Cardiopulmonary complications



J.3.2.4.3 VE/VCO₂

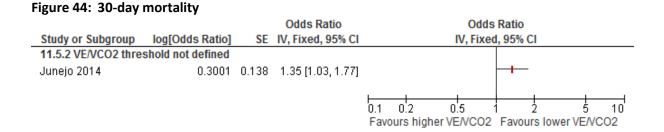


Figure 45: In hospital mortality

			Odds Ratio			Odds	Ratio			
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI			IV, Fixe	d, 95%	CI		
11.2.2 VE/VCO2 thre	shold not defined									
Junejo 2014	0.2311	0.093	1.26 [1.05, 1.51]				+			
					0.2	0.5		<u>+</u>	<u>_</u>	10
				0.1	U.Z		'_	4	Э	10

Favours higher VE/VCO2 Favours lower VE/VCO2

Favours higher VE/VCO2 Favours lower VE/VCO2

Figure 46: All complications Odds Ratio Odds Ratio IV, Fixed, 95% CI Study or Subgroup log[Odds Ratio] SE IV, Fixed, 95% CI 11.8.1 VE/VCO2 threshold not defined Junejo 2014 -0.0305 0.0439 0.97 [0.89, 1.06] 0.1 0.2 0.5 5 ż 11 1 Favours higher VE/VO2 Favours lower VE/VCO2

Figure 47: Cardiopulmonary complications Odds Ratio **Odds Ratio** Study or Subgroup log[Odds Ratio] SE IV, Fixed, 95% CI IV, Fixed, 95% CI 11.12.1 VE/VCO2 threshold not defined Junejo 2014 -0.0202 0.0434 0.98 [0.90, 1.07] 0.1 0.2 2 10 0.5 5

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J.3.2.5 Other types of surgeries

J.3.2.5.1 Anaerobic threshold

Figure 48: Post-operative morbidity

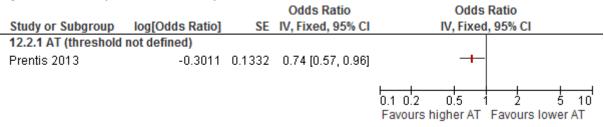


Figure 49: Any complications

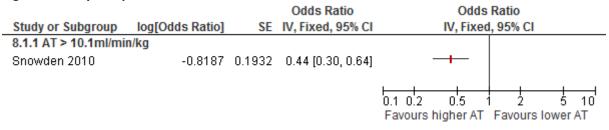


Figure 50: Length of hospital stay

		Hazard Ratio	Hazaro	l Ratio
Study or Subgroup	log[Hazard Ratio] SE	IV, Fixed, 95% CI	IV, Fixed	1, 95% CI
12.1.1 AT 12 ml/min/k	g			
Prentis 2013	-0.755 0.2643	0.47 [0.28, 0.79]	— + —	
			0.1 0.2 0.5	
			••••	
			Favours AT > threshold	Favours AT < threshold

J.3.2.5.2 VO₂

Figure 51: Surgical complications

			Odds Ratio		0	dds Ratio		
Study or Subgroup log[O	dds Ratio]	SE	IV, Fixed, 95% CI		IV, Fixed, 95% CI			
2.3.1 Peak VO2 < 15.8mL/kg	g/min							
McCullough 2006	2.5565 1.2	375	12.89 [1.14, 145.76]					
2.3.2 Peak VO2 (continuous	i)							
McCullough 2006	0.4762 0.1	542	1.61 [1.19, 2.18]					
				0.01	0.1	1		10

Favours lower peak VO2 Favours higher peak VO2

J.3.2.5.3 VE/VCO2

Figure 52: Surgical complications

			Odds Ratio		Odds	Ratio	
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI		IV, Fixed	d, 95% CI	
5.2.1 VE/VCO2 ≥ 34.5							
Junejo 2012	1.3788	0.5174	3.97 [1.44, 10.95]				-
				0.01 0.	1 ·	1	0 100
				Favours high			• • • •

Figure 53: Cardiopulmonary complications

Study or Subgroup	log[Odds Ratio]	SE	Odds Ratio IV, Fixed, 95% Cl			Ratio 1, 95% Cl	
5.1.1 VE/VCO2 ≥ 34.5							
Junejo 2012	1.2384	0.4941	3.45 [1.31, 9.09]				
					1		
				0.01 0 Favours high		10 Favours lower	100 VE/VCO2

J.4 Polysomnography

See Section 9.7.1 of the full guideline for evidence statements.

J.4.1 Intervention evidence

Figure 54: Respiratory complications

	Polysomnog	graphy	No polysomno	ography		Risk Ratio	Risk Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% Cl	M-H, Fixed, 95% Cl
Chung 2008	39	211	25	205	100.0%	1.52 [0.95, 2.41]	
Total (95% CI)		211		205	100.0%	1.52 [0.95, 2.41]	
Total events	39		25				
Heterogeneity: Not ap Test for overall effect:		.08)					0.1 0.2 0.5 1 2 5 10 Favours Polysom Favours No polysom

Figure 55: Cardiac complications

	Polysomnog	graphy	No polysomno	ography		Risk Ratio	Risk Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% Cl	I M-H, Fixed, 95% CI
Chung 2008	12	211	6	205	100.0%	1.94 [0.74, 5.08]	
Total (95% CI)		211		205	100.0%	1.94 [0.74, 5.08]	
Total events	12		6				
Heterogeneity: Not ap Test for overall effect:).18)					0.1 0.2 0.5 1 2 5 10 Favours Polysom Favours No polysom

Figure 56: Neurological complications

0	•	•					
	Polysomno	graphy	No polysomr	ography		Risk Ratio	Risk Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% Cl	M-H, Fixed, 95% CI
Chung 2008	2	211	3	205	100.0%	0.65 [0.11, 3.84]	
Total (95% CI)		211		205	100.0%	0.65 [0.11, 3.84]	
Total events	2		3				
Heterogeneity: Not ap	plicable						
Test for overall effect:	Z = 0.48 (P = 0	.63)					0.1 0.2 0.5 1 2 5 10 Favours Polysom Favours No polysom

Figure 57: Unplanned ICU admission

	Polysomnog	graphy	No polysomn	ography		Peto Odds Ratio	Peto Odds Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	Peto, Fixed, 95% Cl	CI Peto, Fixed, 95% CI
Chung 2008	4	211	1	205	100.0%	3.26 [0.56, 19.00]	
Total (95% CI)		211		205	100.0%	3.26 [0.56, 19.00]	
Total events	4		1				
Heterogeneity: Not ap Test for overall effect:		.19)					0.01 0.1 1 10 100 Favours Polysom Favours No polysom

Figure 58: Re-admission to ICU

	Polysomnog	graphy	No polysomno	graphy		Risk Ratio	Risk Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Fixed, 95% Cl	I M-H, Fixed, 95% CI
Chung 2008	4	211	5	205	100.0%	0.78 [0.21, 2.85]	
Total (95% CI)		211		205	100.0%	0.78 [0.21, 2.85]	
Total events	4		5				
Heterogeneity: Not app Test for overall effect:		.70)					0.1 0.2 0.5 1 2 5 10 Favours Polysom Favours No polysom

J.4.2 Prognostic evidence

Figure 59: Pulmonary complications

			Odds Ratio		Odds R	atio	
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI		IV, Fixed,	95% CI	
Weingarten 2011	0	0.4189	1.00 [0.44, 2.27]		+		
				0.2	0.5 1	2	5
					AHI>5 A	\HI<5	

Figure 60: Surgical complications

			Odds Ratio		Odds Ratio	
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI		IV, Fixed, 95% CI	
Weingarten 2011	0.2852	0.2658	1.33 [0.79, 2.24]			
				0.5	0.7 1 1.5 2	
					AHI>5 AHI<5	

Figure 61: Other post-operative complications

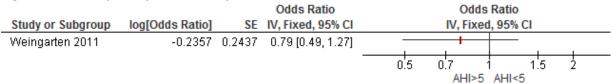


Figure 62: All post-operative complications

0 1	• •		Odds Ratio	Odds Ratio
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI	IV, Fixed, 95% CI
Weingarten 2011	-0.1508	0.1923	0.86 [0.59, 1.25]	
				0.5 0.7 1 1.5 2
				AHI>5 AHI<5

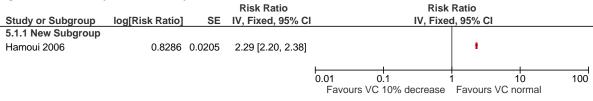
J.5 Health technology assessment update

J.5.1 Lung function tests

See Section 10.8.1 of the full guideline for evidence statements.

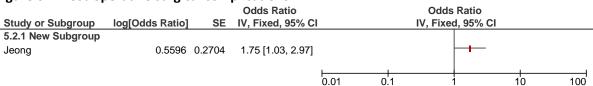
J.5.1.1 Bariatric surgery

Figure 63: Post-operative complications



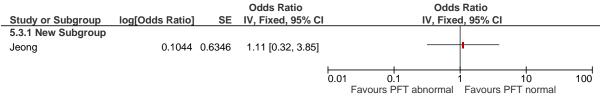
J.5.1.2 Cancer surgery

Figure 64: Post-operative surgical complications



Favours PFT abnormal Favours PFT normal

Figure 65: Systemic complication

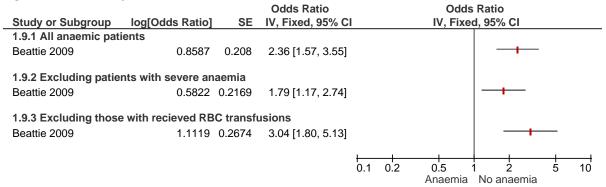


J.5.2 Full blood count

See Section 11.8.1 of the full guideline for evidence statements.

J.5.2.1 All elective surgeries - anaemia

Figure 66: Mortality



J.5.2.2 Orthopaedic surgery – hip or knee arthroplasty

Figure 67: Red blood cell transfusion

		Odds Ratio	Odds	Ratio	
Study or Subgroup	log[Odds Ratio] S	E IV, Fixed, 95% CI	IV, Fixed	d, 95% CI	
1.4.1 New Subgroup					
Jans 2014	1.5476 0.108	5 4.70 [3.80, 5.81]		-	+
			0.2 0.5	1 2	5
			No anaemia	Anaemia	

Figure 68: Allogenic blood transfusion

Study or Subgroup	log[Odds Ratio]	SE	Odds Ratio IV, Fixed, 95% CI			Ratio d, 95% Cl		
1.12.1 Total hip arthr	oplasty							
Yoshihara 2014	0.708	0.0446	2.03 [1.86, 2.22]			+		
1.12.2 Total knee arth	nroplasty							
Yoshihara 2014	0.9933	0.0352	2.70 [2.52, 2.89]			+		
				I				
				0.01	0.1	1	10	100
					Favours anaemia	Favours no	o anaemia	a

Figure 69: Increased length of stay ≥5 days

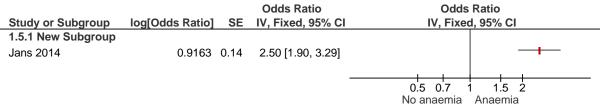


Figure 70: Readmission 90 days after surgery

			Odds Ratio		Odds	Ratio	
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI		IV, Fixe	d, 95% Cl	
1.6.1 New Subgroup							
Jans 2014	0.3365	0.123	1.40 [1.10, 1.78]				
				<u> </u>	0.5		<u>F</u>
				0.2	•••	1 <u>,</u> 2	Э
					No anaemia	Anaemia	

Figure 71: Joint infection

			Odds Ratio	Odds Ratio
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI	IV, Fixed, 95% CI
1.7.1 New Subgroup				
Greenky 2012	0.6678	0.1654	1.95 [1.41, 2.70]	_
				0.5 0.7 1 1.5 2
				Anaemia No anaemia

Figure 72: Mortality **Odds Ratio Odds Ratio** IV, Fixed, 95% CI Study or Subgroup log[Odds Ratio] SE IV, Fixed, 95% CI 1.8.1 30 day mortality Greenky 2012 -0.5361 0.9168 0.59 [0.10, 3.53] 1.8.2 90 day mortality Greenky 2012 0.4318 0.5729 1.54 [0.50, 4.73] 1.8.3 1 year mortality Greenky 2012 0.5933 0.3043 1.81 [1.00, 3.29] 0.01 10 100 0.1 Anaemia No anaemia

National Institute for Health and Care Excellence, 2016

Figure 73: Hyperglycaemia

			Odds Ratio		Odds	s Ratio	
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI		IV, Fixe	d, 95% Cl	
Jamsen 2015	1.361	0.7425	3.90 [0.91, 16.71]		1		
				0.01	0.1	1 10	100
					Favours anaemia	Favours no anaemia	

Figure 74: Severe Hyperglycaemia

			Odds Ratio			Odds R	Ratio		
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI		IV	, Fixed,	95% CI		
Jamsen 2015	0.6931	0.7073	2.00 [0.50, 8.00]						
				0.01	0.1	1		10	100
					Favours ana	emia F	avours no	anaemia	ì

J.5.2.3 Vascular surgery - anaemia

Figure 75: Major adverse cardiac event

			Odds Ratio		Odds	Ratio	
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% Cl		IV, Fixe	d, 95% CI	
1.1.1 Mild							
Dunkelgrun 2008	0.5878	0.4137	1.80 [0.80, 4.05]		-		
1.1.2 Moderate							
Dunkelgrun 2008	0.8329	0.3763	2.30 [1.10, 4.81]				
1.1.3 Severe							
Dunkelgrun 2008	1.5476	0.3021	4.70 [2.60, 8.50]				
				0.01	0.1	1 10	100
				0.01	•••	Favours no anemia	

J.5.2.4 Vascular surgery – white blood cell count

Figure 76: Surgical complications

			Odds Ratio			Odds Ratio		
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI		IV	, Fixed, 95% C	1	
3.1.1 Endovascular c	ohort							
Amaranto 2011	0.2814	0.0911	1.32 [1.11, 1.58]			+		
3.1.2 Open cohort								
Amaranto 2011	-0.0349	0.0567	0.97 [0.86, 1.08]			+		
				<u> </u>				
				0.01	0.1	1	10	100

Favours higher WBC count Favours lower WBC count

Figure 77: Major adverse events

			Odds Ratio		Odds Ratio
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI		IV, Fixed, 95% CI
3.2.1 Endovascular c	ohort				
Amaranto 2011	0.514	0.1562	1.67 [1.23, 2.27]		-+-
3.2.2 Open cohort					
Amaranto 2011	0.0677	0.0434	1.07 [0.98, 1.17]		Ŧ
				I	
				0.01	0.1 1 10 100 Favours higher WBC count Favours lower WBC count

Figure 78: Mortality

			Odds Ratio	Odds Ratio
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% Cl	IV, Fixed, 95% CI
3.3.1 Endovascular c	ohort			
Amaranto 2011	0.601	0.2471	1.82 [1.12, 2.96]	-+
3.3.2 Open cohort				
Amaranto 2011	0.1553	0.0553	1.17 [1.05, 1.30]	+
				0.01 0.1 1 10 100 Favours higher WBC count Favours lower WBC count

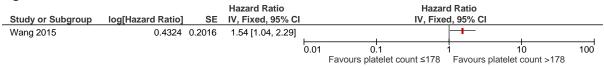
J.5.2.5 Cancer surgery – White blood cell count

Figure 79: Survival

			Hazard Ratio	Hazard	Ratio	
Study or Subgroup	log[Hazard Ratio]	SE	IV, Fixed, 95% CI	I IV, Fixed	l, 95% Cl	
3.4.1 ≤9.5 vs >9.5						
Bedke 2012	0.6471	0.2815	1.91 [1.10, 3.32]			
3.4.2 ≤10.0 vs >10.0						
Bedke 2012	0.4447	0.3038	1.56 [0.86, 2.83]	-	+	
3.4.3 ≤11.0 vs >11.0						
Bedke 2012	0.678	0.3459	1.97 [1.00, 3.88]			
				H H		
				0.01 0.1 1	10	100
				Favours higher WBC	Favours lower WBC	

J.5.2.6 Cancer surgery – Platelet count

Figure 80: Survival



J.5.2.7 Non-cardiac surgery - platelet count

Figure 81: Blood transfusion

Study or Subgroup	log[Odds Ratio]	SE	Odds Ratio IV, Fixed, 95% CI		s Ratio d, 95% Cl
2.1.1 Moderate-to-sev	<u> </u>	-	IV, I IXEU, 33 /8 CI	10,11/6	
	, ,		4 70 [4 40 0 00]		+
Glance 2014	0.5653	0.085	1.76 [1.49, 2.08]		•
2.1.2 Mild thrombocy	topenia				
Glance 2014	0.2469	0.0415	1.28 [1.18, 1.39]		+
2.1.3 Low-normal thro Glance 2014		0.0259	1.01 [0.96, 1.06]		+
2.1.4 Thrombocytosis Glance 2014	0.3646	0.0522	1.44 [1.30, 1.60]		+
				0.01 0.1 Favours thrombocytopenia	1 10 100 Favours normal

Figure 82: Mortality

			Odds Ratio	Odds Ratio
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI	IV, Fixed, 95% CI
2.2.1 Moderate-to-sev	ere thrombocytop	enia		
Glance 2014	0.6575	0.153	1.93 [1.43, 2.60]	+
2.2.2 Mild thrombocyt	openia			
Glance 2014	0.27	0.0845	1.31 [1.11, 1.55]	+
2.2.3 Low-normal thro	mbocytopenia			
Glance 2014	-0.0943	0.0657	0.91 [0.80, 1.04]	*
2.2.4 Thrombocytosis				
Glance 2014	-0.0619	0.136	0.94 [0.72, 1.23]	-#-
				0.01 0.1 1 10 100 Favours thrombocytopenia Favours normal

Figure 83: Mortality or major complication

Odds Ratio	Odds Ratio
IV, Fixed, 95% C	I IV, Fixed, 95% CI
1.52 [1.32, 1.75]	+
1.12 [1.04, 1.21]	t
1.00 [0.96, 1.04]	†
1.36 [1.25, 1.48]	+
	0.01 0.1 1 10 100

Favours thrombocytopenia Favours normal

Figure 84: Cardiac complication

		_	Odds Ratio	Odds Ratio	
Study or Subgroup		SE .	IV, Fixed, 95% CI	IV, Fixed, 95% Cl	
2.4.1 Moderate-to-sev	vere thrombocytopenia				
Glance 2014	0.0198 0.214	14	1.02 [0.67, 1.55]		
2.4.2 Mild thrombocy	topenia				
Glance 2014	-0.0101 0.102	24	0.99 [0.81, 1.21]	+	
2.4.3 Low-normal three	ombocytopenia				
Glance 2014	0.077 0.065	54	1.08 [0.95, 1.23]	+	
2.4.4 Thrombocytosis	5				
Glance 2014	0.1222 0.15	13	1.13 [0.84, 1.52]	-+	
					100
				Favours thrombocytopenia Favours normal	

Figure 85: Pulmonary complication

			Odds Ratio	Odds Ratio
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% Cl	IV, Fixed, 95% CI
2.5.1 Moderate-to-sev	vere thrombocytop	penia		
Glance 2014	0.6259	0.1125	1.87 [1.50, 2.33]	+
2.5.2 Mild thrombocy	topenia			
Glance 2014	0.077	0.0654	1.08 [0.95, 1.23]	+
2.5.3 Low-normal three	ombocytopenia			
Glance 2014	0.0583	0.0349	1.06 [0.99, 1.14]	•
2.5.4 Thrombocytosis	S			
Glance 2014	0.2624	0.076	1.30 [1.12, 1.51]	+
				0.01 0.1 1 10 100
				Favours thrombocytopenia Favours normal

Figure 86: Renal complication

Study or Subgroup	log[Odds Ratio]	SE	Odds Ratio IV, Fixed, 95% CI	IV	Odds Ratio , Fixed, 95% Cl	
2.6.1 Moderate-to-sev	0		, ,		,,	
Glance 2014	0.7178	0.1662	2.05 [1.48, 2.84]		+	
2.6.2 Mild thrombocy	topenia					
Glance 2014	0.3716	0.0966	1.45 [1.20, 1.75]		+	
2.6.3 Low-normal thr	ombocytopenia					
Glance 2014	0.0583	0.0723	1.06 [0.92, 1.22]		+	
2.6.4 Thrombocytosis	S					
Glance 2014	0.392	0.1332	1.48 [1.14, 1.92]		+	
				0.01 0.1	1 10	100
				0.01 0.1	1 10	100

0.01 0.1 1 10 Favours thrombocytopenia Favours normal

Figure 87: CNS complication

		Odds Ratio	Odds Ratio
Study or Subgroup	log[Odds Ratio] S	E IV, Fixed, 95% C	I IV, Fixed, 95% CI
2.7.1 Moderate-to-sev	vere thrombocytopenia		
Glance 2014	-0.3147 0.389	9 0.73 [0.34, 1.57]	-+
2.7.2 Mild thrombocy	topenia		
Glance 2014	0.1222 0.145	53 1.13 [0.85, 1.50]	+
2.7.3 Low-normal three	ombocytopenia		
Glance 2014	0.01 0.100	1.01 [0.83, 1.23]	+
2.7.4 Thrombocytosis	6		
Glance 2014	0.0862 0.233	1.09 [0.69, 1.72]	
			0.01 0.1 1 10 100
			Favours thrombocytopenia Favours normal

Figure 88: Sepsis complication

			Odds Ratio	Odds Ratio
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% C	I IV, Fixed, 95% CI
2.8.1 Moderate-to-sev	vere thrombocytop	enia		
Glance 2014	0.157	0.1226	1.17 [0.92, 1.49]	+-
2.8.2 Mild thrombocy	topenia			
Glance 2014	0	0.0595	1.00 [0.89, 1.12]	+
2.8.3 Low-normal three	ombocytopenia			
Glance 2014	-0.0513	0.0391	0.95 [0.88, 1.03]	*
2.8.4 Thrombocytosis	5			
Glance 2014	0.239	0.0641	1.27 [1.12, 1.44]	+
				0.010.1110100Favours thrombocytopeniaFavours normal

Figure 89: Wound complication

Study or Subgroup	log[Odds Ratio]	SE	Odds Ratio IV, Fixed, 95% CI		Odds Ratio IV, Fixed, 95% Cl	
2.9.1 Moderate-to-sev	0. 1	-	11,11,100,007,007			
Glance 2014	0.2151	0.1253	1.24 [0.97, 1.59]		+	
2.9.2 Mild thrombocy	topenia					
Glance 2014	0.1044	0.0636	1.11 [0.98, 1.26]		I	
2.9.3 Low-normal thro	ombocytopenia					
Glance 2014	-0.0619	0.0337	0.94 [0.88, 1.00]		*	
2.9.4 Thrombocytosis	5					
Glance 2014	0.3988	0.0657	1.49 [1.31, 1.69]		+	
				0.01 0.1	1	10 100

0.01 0.1 1 10 Favours thrombocytopenia Favours normal

Figure 90: Thromboembolic complication

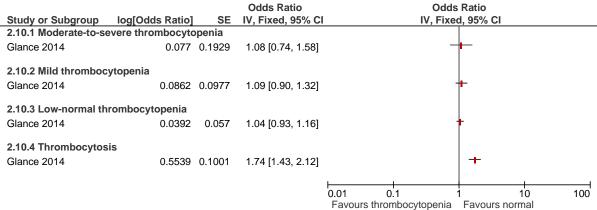
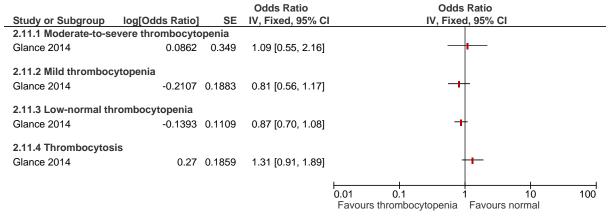


Figure 91: Graft failure

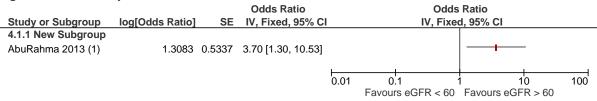


J.5.3 Kidney function tests (urea and electrolytes)

See Section 12.8.1 of the full guideline for evidence statements.

J.5.3.1 Vascular surgery- eGFR

Figure 92: Mortality or stroke



Footnotes

(1) eGFR value refers to a cut off of 60 ml/min/1.73m²

J.5.3.2 Endovascular repair of abdominal aortic aneurysm- eGFR

Figure 93: Perioperative mortality

-	eGFR > 60 m	L/min	eGFR < 60 r	nL/min	Risk Ratio	Risk Ratio
Study or Subgroup	Events	Total	Events	Total	M-H, Fixed, 95% CI	
4.5.1 New Subgroup						
Soong 2008	1	89	3	66	0.25 [0.03, 2.32]	
						0.01 0.1 1 10 100
						Favours eGFR > 60 mL/min Favours eGFR < 60 mL/min

Figure 94: Post-operative renal failure

	eGFR > 60 n	nL/min	eGFR < 60 r	nL/min	Peto Odds Ratio	Peto Odds Ratio				
Study or Subgroup	Events	Total	Events	Total	Peto, Fixed, 95% Cl	Peto, Fixed, 95% Cl				
4.6.1 New Subgroup										
Soong 2008	0	89	16	66	0.07 [0.03, 0.21]	— i —				
						0.001 0.1	1 10	1000		
						Favours eGFR > 60 mL/min	Favours eGFR < 60 n	nL/min		

J.5.3.3 Non-cardiac surgery -eGFR

Figure 95: Mortality

			Odds Ratio	Odds Ratio
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI	I IV, Fixed, 95% CI
4.2.1 Stage 2				
Mases 2014	-0.2231	0.5004	0.80 [0.30, 2.13]	
4.2.2 Stage 3a				
Mases 2014	0.7885	0.456	2.20 [0.90, 5.38]	
4.2.3 Stage 3b				
Mases 2014	1.0296	0.5791	2.80 [0.90, 8.71]	++
4.2.4 Stage 4				
Mases 2014	2.4248	0.493	11.30 [4.30, 29.70]	+
4.2.5 Stage 5				
Mases 2014	1.7579	0.69	5.80 [1.50, 22.43]	—— + ——
				0.01 0.1 1 10 100

1 0.1 1 10 100 Favours lower eGFR Favours higher eGFR

Figure 96: Post-operative MACE

			Odds Ratio	Odds Ratio
Study or Subgroup	log[Odds Ratio]	SE		
4.3.1 Stage 2				· · · ·
Mases 2014	0.4055	0.2606	1.50 [0.90, 2.50]	++
4.3.2 Stage 3a				
Mases 2014	0.5878	0.3537	1.80 [0.90, 3.60]	
4.3.3 Stage 3b				
Mases 2014	1.361	0.3669	3.90 [1.90, 8.01]	- i -
4.3.4 Stage 4				
Mases 2014	1.5686	0.4728	4.80 [1.90, 12.13]	— —
4.3.5 Stage 5				
Mases 2014	1.361	0.5605	3.90 [1.30, 11.70]	i
				Favours lower eGFR Favours higher eGFR

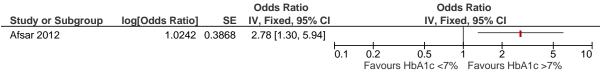
J.6 Glycated haemoglobin test

J.6.1 Diagnosed diabetes

See Section 14.1.7 of the full guideline for evidence statements.

J.6.1.1 Primary arteriovenous fistula failure

Figure 97: Post-operative complications



J.6.1.2 Hip/ joint arthroplasty

Figure 98: Periprothetic joint infection

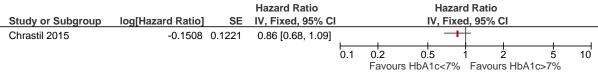


Figure 99: Death

			Hazard Ratio			Hazar	d Ratio		
Study or Subgroup	log[Hazard Ratio]	SE	IV, Fixed, 95% CI			IV, Fixe	d, 95% Cl		
Chrastil 2015	0.2624	0.0932	1.30 [1.08, 1.56]				+		
					02	0.5			10
				0.1	Favou	rs HbA1c<7%	Favours Hb	A1c>7%	10

J.6.1.3 Non-cardiac surgery

Figure 100: Infections complications

		-							
			Odds Ratio	Odds Ratio					
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI			IV, Fixed	l, 95% CI		
Dronge 2006	0.7561	0.2802	2.13 [1.23, 3.69]					_	
				—					
				0.1	0.2	0.5 1	i ż	5	11
						HbA1c<7	HbA1c>7		

J.6.1.4 Joint arthroplasty

Figure 101: 90-day mortality

			Odds Ratio			Odd	s Ratio		
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI			IV, Fixe	ed, 95% Cl		
Harris 2013	0.3148	0.2619	1.37 [0.82, 2.29]			-	+ t		
				0.1	0.2	0.5	1 2	5	10
					Favou	rs HBA1c<7	' Favours HE	3A1c>7	

Figure 102: Number of complications

		Odds Ratio		Odds Ratio						
Study or Subgroup	log[Odds Ratio] SE	IV, Fixed, 95% CI		IV, Fixed, 95% CI						
Harris 2013	0.1655 0.1	1.18 [0.97, 1.44]								
			0.1	0.2	0.5	1	2	5	10	
				Favou	Irs HbA1c	<7 Fa	vours Hb	oA1c>7		

Figure 103: All complications

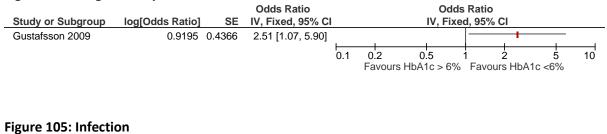
		Odds Ratio			Odds Ratio				
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI	I IV, Fixed, 95% CI					
1.4.1 All complication	IS								
Harris 2013	0.1989	0.0964	1.22 [1.01, 1.47]				+-		
				0.1	0.2 Favours	0.5 s HbA1c<7	1 7 Favou	2 5 rs HbA1c>7	, 10

J.6.2 Undiagnosed diabetes

See Section 14.2.6 of the full guideline for evidence statements.

J.6.2.1 Colorectal surgery

Figure 104: Surgical complications



Odds Ratio Odds Ratio Study or Subgroup log[Odds Ratio] SE IV, Fixed, 95% CI IV, Fixed, 95% CI Gustafsson 2009 0.7022 0.4866 2.02 [0.78, 5.24] 10 0.1 0.2 0.5 2 5 1 Favours HbA1c > 6% Favours HbA1c