# **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

#### Disclaimer

Healthcare professionals are expected to take NICE clinical guidelines fully into account when exercising their clinical judgement. However, the guidance does not override the responsibility of healthcare professionals to make decisions appropriate to the circumstances of each patient, in consultation with the patient and, where appropriate, their guardian or carer.

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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	

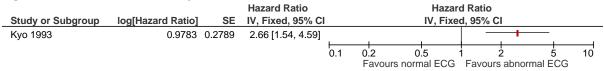
#### Figure 2: Abnormal ECG as a predictor of post-operative complications

			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]				<b>I</b>		
				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

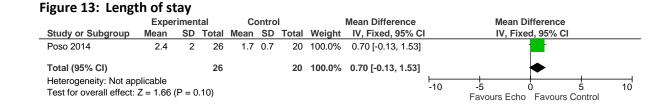
Study or Subgroup	log[Risk Ratio]	SE	Resting echo Total		Weight	Risk Ratio IV, Fixed, 95% CI			k Ratio ed, 95%			
Wijeysundera 2011	0.131	0.0567	35498	35498	100.0%	1.14 [1.02, 1.27]				_		
Total (95% Cl)			35498	35498	100.0%	1.14 [1.02, 1.27]				•		
Heterogeneity: Not ap Test for overall effect:		)					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 VO<sub>2</sub>

#### 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]							<b>→</b>
			⊢ 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

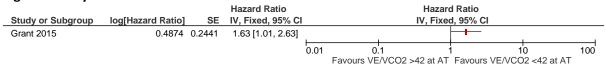
#### Figure 24: Pulmonary complications

			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

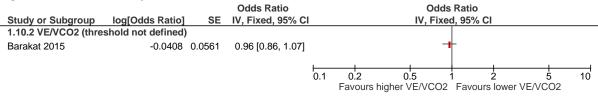
#### J.3.2.1.3 VE/VCO2

#### 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

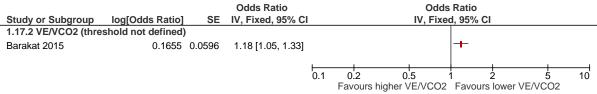
#### Figure 26: 3-year survival



#### Figure 27: Cardiac complications



#### Figure 28: Respiratory complications



#### J.3.2.2 Lung resection surgery

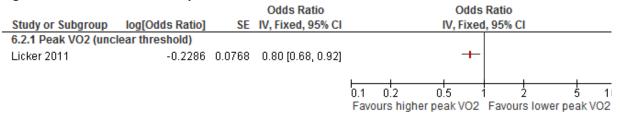
#### J.3.2.2.1 VO<sub>2</sub>

**Complications** 

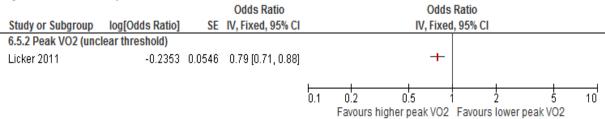
#### Figure 29: Pulmonary complications

			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



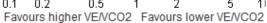
#### Figure 32: Cardiopulmonary complications

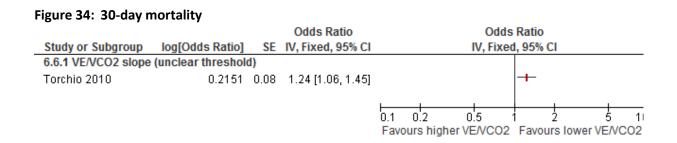
			Odds Ratio	Odds	Ratio
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI	IV, Fixed	I, 95% CI
6.1.1 Peak VO2 (unc	lear threshold)				
Torchio 2010	-2.9957	0.8212	0.05 [0.01, 0.25]	← +	
				I	
				0.01 0.1 1	i 1'0 100'
				Favours higher peak VO2	Favours lower peak VO2

#### J.3.2.2.2 VE/VCO<sub>2</sub> 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	<del>ار</del> ا	<del>ا</del>	ļ	)	<u></u>	1

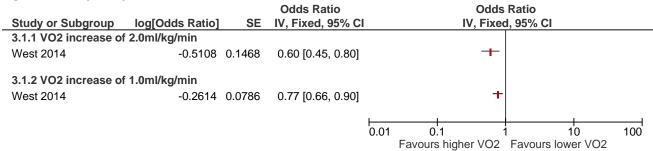




#### J.3.2.3 Major colonic surgery

#### Peak VO<sub>2</sub>

#### 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]	
<b>11.1.2 AT threshold r</b> 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]	- <b>+</b> - <b>+</b>	
				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

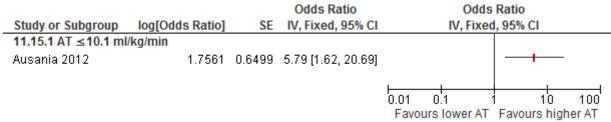
#### Figure 38: Cardiopulmonary complications

			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]	<del></del>
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 VO<sub>2</sub>

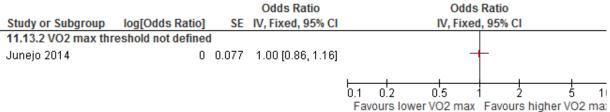
#### Figure 41: In-hospital mortality

			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]	_ <b>_</b>
				Favours lower VO2 max Favours higher VO2 max

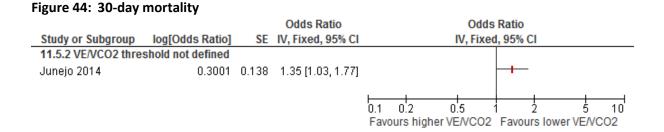
#### Figure 42: 30-day mortality

			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/VCO<sub>2</sub>



#### 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

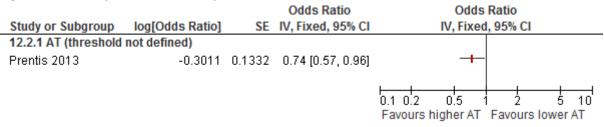
#### Figure 47: Cardiopulmonary complications Odds Ratio **Odds Ratio** Study or Subgroup log[Odds Ratio] SE IV, Fixed, 95% CI IV, Fixed, 95% CI 11.12.1 VE/VCO2 threshold not defined Junejo 2014 -0.0202 0.0434 0.98 [0.90, 1.07] 0.1 0.2 2 10 0.5 5

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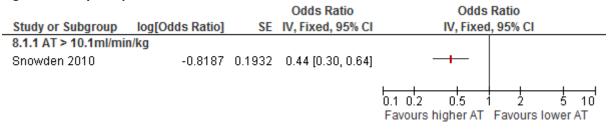
#### J.3.2.5 Other types of surgeries

#### 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]	— <b>+</b> —	
			0.1 0.2 0.5	
			••••	
			Favours AT > threshold	Favours AT < threshold

#### J.3.2.5.2 VO<sub>2</sub>

#### 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]		<b>+</b>		
				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

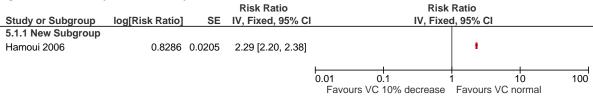
### J.5 Health technology assessment update

#### J.5.1 Lung function tests

See Section 10.8.1 of the full guideline for evidence statements.

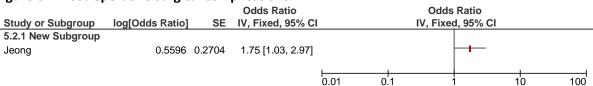
#### J.5.1.1 Bariatric surgery

#### 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

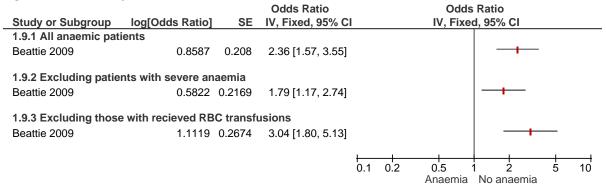


#### J.5.2 Full blood count

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]	<b>_</b>
				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

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#### 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]			<b></b>	
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
				<b>I</b>	
				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

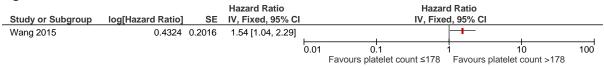
#### J.5.2.5 Cancer surgery – White blood cell count

#### 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]		<b></b>	
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]	<b>†</b>
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]	<b>+</b>	
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

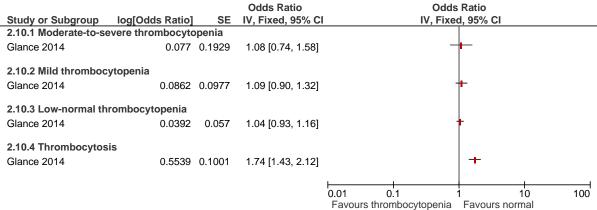
			Odds Ratio	Odds Ratio
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% C	I IV, Fixed, 95% CI
2.8.1 Moderate-to-sev	vere thrombocytop	enia		
Glance 2014	0.157	0.1226	1.17 [0.92, 1.49]	+-
2.8.2 Mild thrombocy	topenia			
Glance 2014	0	0.0595	1.00 [0.89, 1.12]	+
2.8.3 Low-normal three	ombocytopenia			
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

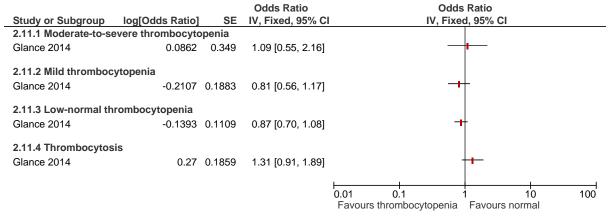
Study or Subgroup	log[Odds Ratio]	SE	Odds Ratio IV, Fixed, 95% CI		Odds Ratio IV, Fixed, 95% Cl	
2.9.1 Moderate-to-sev	0. 1	-	11,11,100,007,007			
Glance 2014	0.2151	0.1253	1.24 [0.97, 1.59]		<b>+</b>	
2.9.2 Mild thrombocy	topenia					
Glance 2014	0.1044	0.0636	1.11 [0.98, 1.26]		<b>I</b>	
2.9.3 Low-normal 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

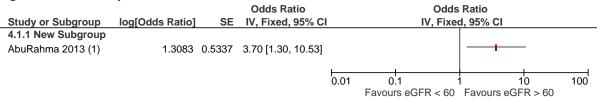


#### J.5.3 Kidney function tests (urea and electrolytes)

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/1.73m<sup>2</sup>

#### 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]	— <b>i</b> —				
						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]	<b>+</b>
4.2.5 Stage 5				
Mases 2014	1.7579	0.69	5.80 [1.50, 22.43]	—— <b>+</b> ——
				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]	<del>- i -</del>
4.3.4 Stage 4				
Mases 2014	1.5686	0.4728	4.80 [1.90, 12.13]	— <del> </del> —
4.3.5 Stage 5				
Mases 2014	1.361	0.5605	3.90 [1.30, 11.70]	<b>i</b>
				Favours lower eGFR Favours higher eGFR

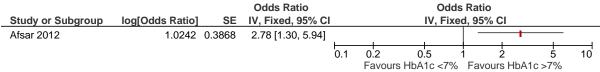
## J.6 Glycated haemoglobin test

### J.6.1 Diagnosed diabetes

See Section 14.1.7 of the full guideline for evidence statements.

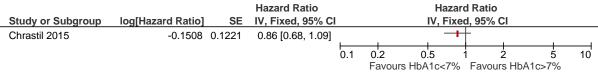
#### J.6.1.1 Primary arteriovenous fistula failure

#### 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]					_	
				<b>—</b>					
				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]			-	+ <b>t</b>		
				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

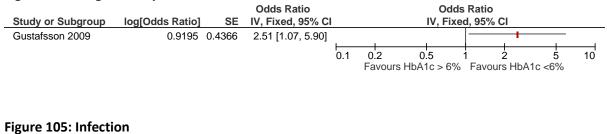
		Odds Ratio			Odds Ratio				
Study or Subgroup	log[Odds Ratio]	SE	IV, Fixed, 95% CI	I IV, Fixed, 95% CI					
1.4.1 All complication	IS								
Harris 2013	0.1989	0.0964	1.22 [1.01, 1.47]				+-		
				0.1	0.2 Favours	0.5 s HbA1c<7	1 7 Favou	2 5 rs HbA1c>7	, 10

#### 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