Clinical trial results:
Preoperative Volume Replacement vs. usual care in Diabetic patients having CABG surgery: a randomised controlled Trial

Summary

EudraCT number	2009-013159-31
Trial protocol	GB
Global end of trial date	23 August 2019

Results information

Result version number	v1 (current)
This version publication date	15 April 2020
First version publication date	15 April 2020

Trial information

Trial identification

Sponsor protocol code	CS/2009/3292

Additional study identifiers

ISRCTN number	ISRCTN02159606
ClinicalTrials.gov id (NCT number)	-
WHO universal trial number (UTN)	-

Notes:

Sponsors

Sponsor organisation name	University Hospitals Bristol NHS Foundation Trust
Sponsor organisation address	Research & Innovation Dept, Level 3, UH Bristol Education Centre, Upper Maudlin Street, Bristol, United Kingdom, BS2 8AE
Public contact	University Hospitals Bristol NHS Foundation Trust, Research and Development Department, 0117 342 0233, R&DSponsorship@UHBristol.nhs.uk
Scientific contact	University of Bristol, Clinical Trials Evaluation Unit, 0117 342 3151, btc-mailbox@bristol.ac.uk

Notes:

Paediatric regulatory details

Is trial part of an agreed paediatric investigation plan (PIP)	No
Does article 45 of REGULATION (EC) No 1901/2006 apply to this trial?	No
Does article 46 of REGULATION (EC) No 1901/2006 apply to this trial?	No

Notes:

Results analysis stage

Analysis stage	Final
Date of interim/final analysis	22 October 2018
Is this the analysis of the primary completion data?	Yes
Primary completion date	13 November 2014
Global end of trial reached?	Yes
Global end of trial date	23 August 2019
Was the trial ended prematurely?	No

Notes:

General information about the trial

Main objective of the trial:

The VeRDiCT Trial is proposed to test the hypothesis that the postoperative incidence of renal insufficiency will be lower, and post-operative recovery faster, if diabetic patients are treated with volume replacement therapy prior to surgery. This treatment has already been shown to prevent acute kidney injury in certain clinical scenarios. Our principal objective is to compare the time from surgery until the patient is 'fit for discharge' in diabetics having coronary artery bypass surgery, randomly assigned to either receive preoperative volume replacement therapy, or to not (i.e. routine care).

Protection of trial subjects:

All potential participants were sent or given an invitation letter and patient information sheet (PIS) (approved by the local Research Ethics Committee,(REC)) describing the study. The patient had time to read the PIS and to discuss their participation with others outside the research team (e.g. relatives or friends) if they wished. Most patients had at least 24 hours to consider whether to participate. Full informed consent was obtained for every trial participant. The patient's GP was informed of their participation in the trial. All members of the direct healthcare team are contractually bound to abide by standard NHS conditions of confidentiality and the need to access medical records will be explained to each patient during the process of obtaining consent.

Background therapy: -

Evidence for comparator: -

Actual start date of recruitment	15 July 2010
Long term follow-up planned	No
Independent data monitoring committee (IDMC) involvement?	No

Notes:

Population of trial subjects

Subjects enrolled per country

Country: Number of subjects enrolled	United Kingdom: 122
Worldwide total number of subjects	122
EEA total number of subjects	122

Notes:

Subjects enrolled per age group

In utero	0
Preterm newborn - gestational age < 37 wk	0
Newborns (0-27 days)	0
Infants and toddlers (28 days-23 months)	0

Children (2-11 years)	0
Adolescents (12-17 years)	0
Adults (18-64 years)	56
From 65 to 84 years	66
85 years and over	0

Subject disposition

Recruitment

Recruitment details:

Of the 331 eligible patients screened, 128 provided written informed consent and agreed to take part in the study.

Pre-assignment

Screening details:

Between July 2010 and July 2014, a total of 444 patients were screened for inclusion in the trial, 113 of whom were ineligible.

Period 1

Period 1 title	Overall trial (overall period)
Is this the baseline period?	Yes
Allocation method	Randomised - controlled
Blinding used	Not blinded

Arms

Are arms mutually exclusive?	Yes
Arm title	Volume replacement therapy

Arm description:

CABG with or without cardiopulmonary bypass (CPB), with preoperative volume replacement therapy (1 ml/kg/hr of Hartmann's solution for 12 consecutive hours prior to surgery).

Arm type	Experimental
Investigational medicinal product name	Hartmann's Solution (Compound Sodium Lactate Intravenous Infusion BP)
Investigational medicinal product code	
Other name	
Pharmaceutical forms	Solution for injection/infusion
Routes of administration	Intravenous use

Dosage and administration details:

The dosage is dependant on body mass as follows: 1ml/kg/hr for 12 hours, therefore, maximum dose (ml) = body mass x12

If for some reason there is less than 12 hours for administration of the IMP, such as a delay in admission to hospital until later than the normal start time for the infusion, or an event that occurs overnight (e.g. patient has a shower) resulting in the infusion being disconnected for a short period, the rate will be increased so that the full dose could be given. The dose will still be equivalent to 1ml/kg/hr for 12 hours, and therefore the maximum dose will stay the same. The minimum time that the IMP can be administered over is 8 hours.

Arm title	Usual care

Arm description:

CABG with or without CPB with conventional preoperative management (no preoperative fluids).

Arm type	No intervention

No investigational medicinal product assigned in this arm

Number of subjects in period 1[1]	Volume replacement therapy	Usual care
Started	60	61
Completed	60	61

Notes:

[1] - The number of subjects reported to be in the baseline period are not the same as the worldwide number enrolled in the trial. It is expected that these numbers will be the same.
Justification: One patient allocated to the volume replacement therapy group was withdrawn post-randomisation, pre-operatively as they had AVR added to their CABG surgery and were therefore ineligible.

Baseline characteristics

Reporting groups	
Reporting group title	Volume replacement therapy
Reporting group description:	
CABG with or without cardiopulmonary bypass (CPB), with preoperative volume replacement therapy (1 ml/kg/hr of Hartmann's solution for 12 consecutive hours prior to surgery).	
Reporting group title	Usual care
Reporting group description:	
CABG with or without CPB with conventional preoperative management (no preoperative fluids).	

Reporting group values	Volume replacement therapy	Usual care	Total
Number of subjects	60	61	121
Age categorical Units: Subjects			
In utero			0
Preterm newborn infants (gestational age < 37 wks)			0
Newborns (0-27 days)			0
Infants and toddlers (28 days-23 months)			0
Children (2-11 years)			0
Adolescents (12-17 years)			0
Adults (18-64 years)			0
From 65-84 years			0
85 years and over			0
Age continuous Units: years			
median	67	66	
inter-quartile range (Q1-Q3)	59.4 to 71.4	60.6 to 70.7	-
Gender categorical Units: Subjects			
Female	9	10	19
Male	51	51	102
Pre-operative creatine > 160µmol/l Units: Subjects			
Yes	4	3	7
No	56	58	114
Ejection fraction < 50% Units: Subjects			
Yes	11	12	23
No	49	49	98
Age >= 70 years Units: Subjects			
Yes	17	17	34
No	43	44	87
Cardiac angiogram in last 5 days Units: Subjects			
Yes	7	5	12

No	53	56	109
Chronic pulmonary disease Units: Subjects			
Yes	6	8	14
No	54	53	107
Extracardiac arteriopathy Units: Subjects			
Yes	6	5	11
No	54	56	110
Neurological dysfunction Units: Subjects			
Yes	2	3	5
No	58	58	116
Unstable angina Units: Subjects			
Yes	2	3	5
No	58	58	116
Myocardial infarction within 90 days Units: Subjects			
Yes	19	13	32
No	41	48	89
NYHA class Units: Subjects			
Class I	17	9	26
Class II	28	36	64
Class III	15	14	29
Class IV	0	2	2
CCS class Units: Subjects			
Asymptomatic	10	7	17
Class I	9	3	12
Class II	15	28	43
Class III	21	18	39
Class IV	5	5	10
>50% disease in left main stem Units: Subjects			
Yes	14	9	23
No	46	52	98
Number of diseased vessels Units: Subjects			
Single	0	2	2
Double	17	15	32
Triple	42	44	86
Unrecorded	1	0	1
Previous PCI Units: Subjects			
Yes	13	7	20
No	47	54	101
Previous MI Units: Subjects			
Yes	33	28	61

No	27	33	60
Diabetes Units: Subjects			
Type I	1	7	8
Type 2 insulin	24	24	48
Type 2 oral	35	30	65
Smoking Units: Subjects			
Current	7	5	12
Ex (>1 month)	31	36	67
Never	22	20	42
Hypertension requiring treatment Units: Subjects			
Yes	55	55	110
No	5	6	11
Hypercholesterolaemia Units: Subjects			
Yes	57	52	109
No	3	9	12
Neurological disease Units: Subjects			
Yes	3	2	5
No	57	58	115
Not recorded	0	1	1
Peptic ulceration Units: Subjects			
Yes	0	2	2
No	60	59	119
Heart rhythm Units: Subjects			
Sinus	55	56	111
AF	3	3	6
Block	1	2	3
Unrecorded	1	0	1
Pacemaker Units: Subjects			
Permanent	2	1	3
None	58	60	118
Operative priority Units: Subjects			
Elective	41	46	87
Urgent	19	15	34
Family history (cardiac) Units: Subjects			
Yes	36	37	73
No	24	23	47
Unrecorded	0	1	1
CPB used (intra-operative) Units: Subjects			
Yes	20	19	39
No	40	42	82

Number of distal coronary anastomoses (intra-operative) Units: Subjects			
One	7	7	14
Two	21	21	42
Three	25	29	54
Four	6	3	9
Five	1	1	2
Number of arterial conduits (intra-operative) Units: Subjects			
None	2	0	2
One	47	57	104
Two	9	4	13
Three	2	0	2
Tranexamic used (intra-operative) Units: Subjects			
Yes	50	55	105
No	10	6	16
Cell saver set up (intra-operative) Units: Subjects			
Yes	9	11	20
No	51	50	101
Intra-operative insulin infusion Units: Subjects			
Yes	36	36	72
No	24	25	49
Intra-operative inotropes			
Excluding noradrenaline			
Units: Subjects			
Yes	3	3	6
No	57	57	114
Unrecorded	0	1	1
Intra-operative noradrenaline Units: Subjects			
Yes	7	9	16
No	53	52	105
Intra-operative pacing			
Excluding patients with pacing beforehand			
Units: Subjects			
Yes	3	8	11
No	54	52	106
Unrecorded	3	1	4
Intra-operative IABP Units: Subjects			
Yes	1	0	1
No	59	61	120
Need for defibrillation (intra-operative and post-operative) Units: Subjects			
Yes	2	2	4
No	58	59	117

Arrhythmias on chest closure			
Excluding patients with permanent pacemaker beforehand			
Units: Subjects			
AF	2	4	6
Other	0	2	2
None, sinus rhythm	56	54	110
Unrecorded	2	1	3
BMI			
Units: kg/m2			
median	30	31	
inter-quartile range (Q1-Q3)	27.0 to 33.8	28.2 to 33.9	-
EuroSCORE (additive)			
Units: N/A			
median	3	2	
inter-quartile range (Q1-Q3)	2 to 4	2 to 4	-
Logistic EuroSCORE			
Units: N/A			
median	2.3	1.8	
inter-quartile range (Q1-Q3)	1.4 to 3.4	1.3 to 3.4	-
Haemoglobin			
Units: g/dL			
median	14	14	
inter-quartile range (Q1-Q3)	12.7 to 14.9	12.4 to 15.1	-
Platelets			
Units: 10^9/L			
arithmetic mean	251	241	
standard deviation	± 63.9	± 59.2	-
Creatinine			
Units: µmol/l			
median	86	87	
inter-quartile range (Q1-Q3)	76.5 to 108.5	75.0 to 100.0	-
Total bypass time (intra-operative)			
Units: minute			
median	80	79	
inter-quartile range (Q1-Q3)	64.5 to 95.0	64.0 to 103.0	-
Cumulative cross-clamp time (intra-operative)			
Units: minute			
arithmetic mean	48	49	
standard deviation	± 13.0	± 17.7	-
Dose of tranexamic acid (intra-operative)			
Units: gram(s)			
median	2	2	
inter-quartile range (Q1-Q3)	2 to 2	2 to 2	-
Volume of cell saver infused (intra-operative)			
Units: millilitre(s)			
median	240	238	
inter-quartile range (Q1-Q3)	100 to 400	0 to 1000	-
Lowest haematocrit (intra-operative)			
Units: percent			
median	31	31	

inter-quartile range (Q1-Q3)	28.0 to 35.9	27.5 to 36.0	-
Dose/weight of VRT			
Units: N/A			
median	12	0	
inter-quartile range (Q1-Q3)	11.7 to 12.0	0 to 0	-
Duration of VRT			
Units: hours			
median	12	0	
inter-quartile range (Q1-Q3)	11.4 to 12.5	0 to 0	-

End points

End points reporting groups

Reporting group title	Volume replacement therapy
Reporting group description: CABG with or without cardiopulmonary bypass (CPB), with preoperative volume replacement therapy (1 ml/kg/hr of Hartmann's solution for 12 consecutive hours prior to surgery).	
Reporting group title	Usual care
Reporting group description: CABG with or without CPB with conventional preoperative management (no preoperative fluids).	
Subject analysis set title	High risk - VRT group
Subject analysis set type	Sub-group analysis
Subject analysis set description: Subgroup of patients with high risk - VRT group	
Subject analysis set title	Low risk - VRT group
Subject analysis set type	Sub-group analysis
Subject analysis set description: Subgroup of patients with low risk - VRT group	
Subject analysis set title	High risk - usual care group
Subject analysis set type	Sub-group analysis
Subject analysis set description: Subgroup of patients with high risk - usual care group	
Subject analysis set title	Low risk - usual care group
Subject analysis set type	Sub-group analysis
Subject analysis set description: Subgroup of patients with low risk - usual care group	
Subject analysis set title	Oral treatment only - VRT group
Subject analysis set type	Sub-group analysis
Subject analysis set description: Subgroup of patients receiving oral treatment only - VRT group	
Subject analysis set title	Oral treatment only - usual care group
Subject analysis set type	Sub-group analysis
Subject analysis set description: Subgroup of patients receiving oral treatment only - usual care group	
Subject analysis set title	Insulin +/- oral treatment - VRT group
Subject analysis set type	Sub-group analysis
Subject analysis set description: Subgroup of patients receiving insulin +/- oral treatment - VRT group	
Subject analysis set title	Insulin +/- oral treatment - usual care group
Subject analysis set type	Sub-group analysis
Subject analysis set description: Subgroup of patients receiving insulin +/- oral treatment - usual care group	

Primary: Time to fitness for discharge

End point title	Time to fitness for discharge
End point description: Time until patients first classified as fit for 'discharge'	
End point type	Primary
End point timeframe: Post-op in-hospital	

End point values	Volume replacement therapy	Usual care	High risk - VRT group	Low risk - VRT group
Subject group type	Reporting group	Reporting group	Subject analysis set	Subject analysis set
Number of subjects analysed	60	61	22	38
Units: Days				
median (inter-quartile range (Q1-Q3))	7 (5 to 12)	7 (5 to 12)	9 (5 to 13)	7 (5 to 9)

End point values	High risk - usual care group	Low risk - usual care group	Oral treatment only - VRT group	Oral treatment only - usual care group
Subject group type	Subject analysis set	Subject analysis set	Subject analysis set	Subject analysis set
Number of subjects analysed	23	37	35	30
Units: Days				
median (inter-quartile range (Q1-Q3))	7 (5 to 12)	7 (5 to 9)	7 (5 to 12)	7 (5 to 12)

End point values	Insulin +/- oral treatment - VRT group	Insulin +/- oral treatment - usual care group		
Subject group type	Subject analysis set	Subject analysis set		
Number of subjects analysed	25[1]	31		
Units: Days				
median (inter-quartile range (Q1-Q3))	7 (5 to 999)	7 (5 to 12)		

Notes:

[1] - 75th percentile (Q3) is undefined. 999 entered

Statistical analyses

Statistical analysis title	Time to fitness for discharge
Comparison groups	Volume replacement therapy v Usual care
Number of subjects included in analysis	121
Analysis specification	Pre-specified
Analysis type	superiority
P-value	= 0.7867
Method	Regression, Cox
Parameter estimate	Hazard ratio (HR)
Point estimate	1.07
Confidence interval	
level	95 %
sides	2-sided
lower limit	0.67
upper limit	1.7

Variability estimate	Standard error of the mean
Dispersion value	0.25

Statistical analysis title	Time to fitness for discharge - high risk
Statistical analysis description:	
Comparing time to fitness for discharge between VRT and usual care groups in high risk patients only	
Comparison groups	High risk - VRT group v High risk - usual care group
Number of subjects included in analysis	45
Analysis specification	Pre-specified
Analysis type	superiority
Method	Regression, Cox
Parameter estimate	Hazard ratio (HR)
Point estimate	0.83
Confidence interval	
level	95 %
sides	2-sided
lower limit	0.32
upper limit	2.13
Variability estimate	Standard error of the mean
Dispersion value	0.4

Statistical analysis title	Time to fitness for discharge - low risk
Statistical analysis description:	
Comparing time to fitness for discharge between VRT and usual care groups in low risk patients only	
Comparison groups	Low risk - VRT group v Low risk - usual care group
Number of subjects included in analysis	75
Analysis specification	Pre-specified
Analysis type	superiority
Method	Regression, Cox
Parameter estimate	Hazard ratio (HR)
Point estimate	1.14
Confidence interval	
level	95 %
sides	2-sided
lower limit	0.63
upper limit	2.08
Variability estimate	Standard error of the mean
Dispersion value	0.35

Statistical analysis title	Time to fitness for discharge - oral treatment
Statistical analysis description:	
Comparing time to fitness for discharge between VRT and usual care groups for patients receiving oral treatment only for their diabetes	
Comparison groups	Oral treatment only - VRT group v Oral treatment only - usual

	care group
Number of subjects included in analysis	65
Analysis specification	Pre-specified
Analysis type	superiority
Method	Regression, Cox
Parameter estimate	Hazard ratio (HR)
Point estimate	1.11
Confidence interval	
level	95 %
sides	2-sided
lower limit	0.6
upper limit	2.07
Variability estimate	Standard error of the mean
Dispersion value	0.35

Statistical analysis title	Time to fitness for discharge - insulin +/- oral
Statistical analysis description:	
Comparing time to fitness for discharge between VRT and usual care groups for patients receiving insulin +/- oral treatment only for their diabetes	
Comparison groups	Insulin +/- oral treatment - VRT group v Insulin +/- oral treatment - usual care group
Number of subjects included in analysis	56
Analysis specification	Pre-specified
Analysis type	superiority
Method	Regression, Cox
Parameter estimate	Hazard ratio (HR)
Point estimate	0.86
Confidence interval	
level	95 %
sides	2-sided
lower limit	0.32
upper limit	2.28
Variability estimate	Standard error of the mean
Dispersion value	0.43

Secondary: Acute kidney injury

End point title	Acute kidney injury
End point description:	
AKI = YES if any post-operative measurement ≥ 1.5 x baseline	
End point type	Secondary
End point timeframe:	
Serum creatinine measured from blood samples collected preoperatively (baseline, pre-trial intervention) and at 0, 24, 48, 72, 96, and 120 hours	

End point values	Volume replacement therapy	Usual care	Oral treatment only - VRT group	Oral treatment only - usual care group
Subject group type	Reporting group	Reporting group	Subject analysis set	Subject analysis set
Number of subjects analysed	60	61	35	30
Units: Subjects				
Yes	18	13	9	7
No	42	48	26	23

End point values	Insulin +/- oral treatment - VRT group	Insulin +/- oral treatment - usual care group		
Subject group type	Subject analysis set	Subject analysis set		
Number of subjects analysed	25	31		
Units: Subjects				
Yes	9	6		
No	16	25		

Statistical analyses

Statistical analysis title	Acute kidney injury
Comparison groups	Volume replacement therapy v Usual care
Number of subjects included in analysis	121
Analysis specification	Pre-specified
Analysis type	superiority
P-value	= 0.2377
Method	Regression, Logistic
Parameter estimate	Odds ratio (OR)
Point estimate	1.65
Confidence interval	
level	95 %
sides	2-sided
lower limit	0.72
upper limit	3.8
Variability estimate	Standard error of the mean
Dispersion value	0.7

Statistical analysis title	Acute kidney injury - oral treatment only
Statistical analysis description:	
Comparing acute kidney injury between VRT and usual care groups in patients receiving oral treatment only for their diabetes	
Comparison groups	Oral treatment only - usual care group v Oral treatment only - VRT group

Number of subjects included in analysis	65
Analysis specification	Pre-specified
Analysis type	superiority
Method	Regression, Logistic
Parameter estimate	Odds ratio (OR)
Point estimate	1.08
Confidence interval	
level	95 %
sides	2-sided
lower limit	0.34
upper limit	3.41
Variability estimate	Standard error of the mean
Dispersion value	0.63

Statistical analysis title	Acute kidney injury - insulin +/- oral treatment
Statistical analysis description:	
Comparing acute kidney injury between VRT and usual care groups in patients receiving insulin +/- oral treatment for their diabetes	
Comparison groups	Insulin +/- oral treatment - VRT group v Insulin +/- oral treatment - usual care group
Number of subjects included in analysis	56
Analysis specification	Pre-specified
Analysis type	superiority
Method	Regression, Logistic
Parameter estimate	Odds ratio (OR)
Point estimate	2.69
Confidence interval	
level	95 %
sides	2-sided
lower limit	0.48
upper limit	15.04
Variability estimate	Standard error of the mean
Dispersion value	2.36

Secondary: Hospital morbidity

End point title	Hospital morbidity
End point description:	

End point type	Secondary
End point timeframe:	
Post-intervention to hospital discharge	

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	60	61		
Units: Subjects				
Yes	51	54		
No	9	7		

Statistical analyses

Statistical analysis title	In-hospital morbidity
Comparison groups	Volume replacement therapy v Usual care
Number of subjects included in analysis	121
Analysis specification	Pre-specified
Analysis type	superiority
P-value	= 0.5547
Method	Regression, Logistic
Parameter estimate	Odds ratio (OR)
Point estimate	0.72
Confidence interval	
level	95 %
sides	2-sided
lower limit	0.25
upper limit	2.12
Variability estimate	Standard error of the mean
Dispersion value	0.4

Secondary: Participants with eGFR <60ml/min on at least 2 of the 8 post-operative times

End point title	Participants with eGFR <60ml/min on at least 2 of the 8 post-operative times

End point description:

Conditional mean imputation used to impute missing values of eGFR.

End point type	Secondary

End point timeframe:

Estimated glomerular filtration rate (eGFR) from serum creatinine measured from blood samples collected preoperatively (baseline, pre-trial intervention), and at 0, 12, 24, 36, 48, 72, 96 and 120 hours after the operation

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	60	61		
Units: Subjects				
Yes	31	28		
No	29	33		

Statistical analyses

Statistical analysis title	eGFR<60 mL/min
Comparison groups	Volume replacement therapy v Usual care
Number of subjects included in analysis	121
Analysis specification	Pre-specified
Analysis type	superiority
P-value	= 0.4219
Method	Regression, Logistic
Parameter estimate	Odds ratio (OR)
Point estimate	1.38
Confidence interval	
level	95 %
sides	2-sided
lower limit	0.63
upper limit	3.01
Variability estimate	Standard error of the mean
Dispersion value	0.55

Secondary: Pre-operative post-intervention blood glucose

End point title	Pre-operative post-intervention blood glucose
End point description:	
End point type	Secondary
End point timeframe:	
Pre-op post-intervention	

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	24	28		
Units: mmol/L				
median (inter-quartile range (Q1-Q3))	6.5 (5.5 to 8.1)	6.9 (5.5 to 8.6)		

Statistical analyses

Statistical analysis title	Pre-operative post-intervention blood glucose
Comparison groups	Volume replacement therapy v Usual care
Number of subjects included in analysis	52
Analysis specification	Pre-specified
Analysis type	superiority
P-value	= 0.759
Method	Regression, Linear
Parameter estimate	Geometric mean ratio
Point estimate	0.97
Confidence interval	
level	95 %
sides	2-sided
lower limit	0.81
upper limit	1.17
Variability estimate	Standard error of the mean
Dispersion value	0.09

Secondary: Pre-operative post-intervention HbA1c	
End point title	Pre-operative post-intervention HbA1c
End point description:	
End point type	Secondary
End point timeframe:	
Pre-op post-intervention	

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	24	28		
Units: mmol/L				
median (inter-quartile range (Q1-Q3))	53.5 (47.5 to 60.5)	54.5 (47.0 to 70.5)		

Statistical analyses

Statistical analysis title	Pre-operative post-intervention HbA1c
Comparison groups	Usual care v Volume replacement therapy
Number of subjects included in analysis	52
Analysis specification	Pre-specified
Analysis type	superiority
P-value	= 0.162
Method	Regression, Linear
Parameter estimate	Geometric mean ratio
Point estimate	0.92
Confidence interval	
level	95 %
sides	2-sided
lower limit	0.81
upper limit	1.04
Variability estimate	Standard error of the mean
Dispersion value	0.06

Secondary: eGFR

End point title	eGFR

End point description:

End point type	Secondary

End point timeframe:

Estimated glomerular filtration rate (eGFR) from serum creatinine measured from blood samples collected preoperatively (baseline, pre-trial intervention), and at 0, 12, 24, 36, 48, 72, 96 and 120 hours after the operation

End point values	Volume replacement therapy	Usual care	Oral treatment only - VRT group	Oral treatment only - usual care group
Subject group type	Reporting group	Reporting group	Subject analysis set	Subject analysis set
Number of subjects analysed	60	61	35	30
Units: mmol/min				
arithmetic mean (standard deviation)				
Pre-operative	70.5 (± 18.9)	69 (± 16)	74.2 (± 14.9)	73.9 (± 16.6)
Operation end	76.0 (± 17.0)	75.7 (± 15.8)	78.9 (± 14.2)	78.9 (± 14.0)
Operation end + 12 hours	69.7 (± 19.2)	69.7 (± 19.6)	73.7 (± 17.9)	75.7 (± 17.1)
Operation end + 24 hours	60.7 (± 20.3)	62.5 (± 21.7)	64.7 (± 19.1)	66.6 (± 20.0)
Operation end + 36 hours	59.5 (± 22.9)	60.5 (± 23.5)	63.2 (± 20.2)	63.1 (± 20.8)
Operation end + 48 hours	59.4 (± 23.8)	58.7 (± 23)	60.8 (± 22.4)	62.8 (± 20.9)
Operation end + 72 hours	62.2 (± 24.8)	63.3 (± 24.4)	66.2 (± 23.5)	66.9 (± 22.8)
Operation end + 96 hours	64.9 (± 25.0)	66.7 (± 24.2)	66.6 (± 24.4)	72.3 (± 21.8)
Operation end + 120 hours	65.0 (± 24.5)	71.0 (± 21.3)	67.7 (± 24.6)	74.3 (± 20.1)

End point values	Insulin +/- oral treatment - VRT group	Insulin +/- oral treatment - usual care group		
Subject group type	Subject analysis set	Subject analysis set		
Number of subjects analysed	25	31		
Units: mmol/min				
arithmetic mean (standard deviation)				
Pre-operative	63.5 (± 24.1)	63.7 (± 14.1)		
Operation end	71.5 (± 20.1)	72.7 (± 17.0)		
Operation end + 12 hours	63.6 (± 20.0)	62.9 (± 20.4)		
Operation end + 24 hours	55.1 (± 21.1)	58.2 (± 22.8)		
Operation end + 36 hours	54.9 (± 25.8)	57.9 (± 26.1)		
Operation end + 48 hours	57.7 (± 25.8)	55.6 (± 24.4)		
Operation end + 72 hours	56.1 (± 26.1)	59.9 (± 25.8)		
Operation end + 96 hours	62.5 (± 262)	61.1 (± 25.7)		
Operation end + 120 hours	62.0 (± 24.5)	67.3 (± 22.5)		

Statistical analyses

Statistical analysis title	eGFR
Comparison groups	Usual care v Volume replacement therapy
Number of subjects included in analysis	121
Analysis specification	Pre-specified
Analysis type	superiority
P-value	= 0.5799
Method	Mixed models analysis
Parameter estimate	Mean difference (net)
Point estimate	-1.06
Confidence interval	
level	95 %
sides	2-sided
lower limit	-4.59
upper limit	2.48
Variability estimate	Standard error of the mean
Dispersion value	1.8

Statistical analysis title	eGFR - oral treatment only
Statistical analysis description:	
Comparing eGFR between VRT and usual care groups in patients receiving oral treatment only for their diabetes	
Comparison groups	Oral treatment only - VRT group v Oral treatment only - usual care group

Number of subjects included in analysis	65
Analysis specification	Pre-specified
Analysis type	superiority
Method	Mixed models analysis
Parameter estimate	Mean difference (net)
Point estimate	-0.23
Confidence interval	
level	95 %
sides	2-sided
lower limit	-4.92
upper limit	4.46
Variability estimate	Standard error of the mean
Dispersion value	2.39

Statistical analysis title	eGFR - insulin +/- oral treatment
Statistical analysis description:	
Comparing eGFR between VRT and usual care groups in patients receiving insulin +/- oral treatment for their diabetes	
Comparison groups	Insulin +/- oral treatment - VRT group v Insulin +/- oral treatment - usual care group
Number of subjects included in analysis	56
Analysis specification	Pre-specified
Analysis type	superiority
Method	Mixed models analysis
Parameter estimate	Mean difference (net)
Point estimate	-2.3
Confidence interval	
level	95 %
sides	2-sided
lower limit	-9.46
upper limit	4.87
Variability estimate	Standard error of the mean
Dispersion value	3.65

Secondary: Microalbumin/creatinine ratio

End point title	Microalbumin/creatinine ratio
End point description:	

End point type	Secondary
End point timeframe:	
Measured in urine samples collected preoperatively (baseline, pre-trial intervention) and at 0, 24, 48 and 120 hours	

End point values	Volume replacement therapy	Usual care	Oral treatment only - VRT group	Oral treatment only - usual care group
Subject group type	Reporting group	Reporting group	Subject analysis set	Subject analysis set
Number of subjects analysed	60	61	35	30
Units: mg/mmol				
median (inter-quartile range (Q1-Q3))				
Pre-operative	1.2 (0.5 to 3.9)	1.4 (0.8 to 2.9)	1 (0.5 to 3.5)	1.1 (0.6 to 2.3)
Operation end	3.4 (2.0 to 9.7)	5.1 (2.1 to 8.7)	2.9 (1.8 to 9.7)	4.2 (1.2 to 8.5)
Operation end + 24 hours	2.9 (1.8 to 7.1)	3.2 (2.0 to 6.1)	2.9 (1.7 to 5.1)	3.4 (1.9 to 6.6)
Operation end + 48 hours	5.1 (2.1 to 8.0)	3.6 (2.1 to 6.7)	4.4 (2.1 to 7.4)	3.6 (2.2 to 5.3)
Operation end + 120 hours	1.6 (1.1 to 7.1)	2.0 (1.4 to 4.1)	1.6 (1.1 to 5)	1.6 (0.6 to 2.9)

End point values	Insulin +/- oral treatment - VRT group	Insulin +/- oral treatment - usual care group		
Subject group type	Subject analysis set	Subject analysis set		
Number of subjects analysed	25	31		
Units: mg/mmol				
median (inter-quartile range (Q1-Q3))				
Pre-operative	2 (0.7 to 5.5)	1.7 (1.1 to 4.1)		
Operation end	3.9 (2.5 to 8.6)	5.6 (2.8 to 9)		
Operation end + 24 hours	3.4 (1.9 to 8.1)	3.1 (2 to 5.8)		
Operation end + 48 hours	5.2 (2.2 to 9.2)	3.7 (2.1 to 6.9)		
Operation end + 120 hours	2.2 (1.1 to 16.1)	2.7 (2 to 6.1)		

Statistical analyses

Statistical analysis title	Microalbumin/creatinine ratio
Comparison groups	Volume replacement therapy v Usual care
Number of subjects included in analysis	121
Analysis specification	Pre-specified
Analysis type	superiority
P-value	= 0.5604
Method	Mixed models analysis
Parameter estimate	Geometric mean ratio
Point estimate	1.07
Confidence interval	
level	95 %
sides	2-sided
lower limit	0.85
upper limit	1.37
Variability estimate	Standard error of the mean
Dispersion value	0.13

Statistical analysis title	Microalbumin/creatinine ratio - oral treatment
Statistical analysis description:	
Comparing microalbumin/creatinine ratio between VRT and usual care groups in patients receiving oral treatment only for their diabetes	
Comparison groups	Oral treatment only - usual care group v Oral treatment only - VRT group
Number of subjects included in analysis	65
Analysis specification	Pre-specified
Analysis type	superiority
Method	Mixed models analysis
Parameter estimate	Geometric mean ratio
Point estimate	1.01
Confidence interval	
level	95 %
sides	2-sided
lower limit	0.73
upper limit	1.4
Variability estimate	Standard error of the mean
Dispersion value	0.17

Statistical analysis title	Microalbumin/creatinine ratio - insulin +/- oral
Statistical analysis description:	
Comparing microalbumin/creatinine ratio between VRT and usual care groups in patients receiving insulin +/- oral treatment for their diabetes	
Comparison groups	Insulin +/- oral treatment - VRT group v Insulin +/- oral treatment - usual care group
Number of subjects included in analysis	56
Analysis specification	Pre-specified
Analysis type	superiority
Method	Mixed models analysis
Parameter estimate	Geometric mean ratio
Point estimate	1.17
Confidence interval	
level	95 %
sides	2-sided
lower limit	0.71
upper limit	1.9
Variability estimate	Standard error of the mean
Dispersion value	0.29

Secondary: C-reactive protein

End point title	C-reactive protein

End point description:

End point type	Secondary

End point timeframe:

Measured preoperatively (baseline, pre-trial intervention) and at 0, 12, 24, 48, 72 and 120 hours after the operation.

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	26	28		
Units: mg/L				
median (inter-quartile range (Q1-Q3))				
Pre-operative	2 (1 to 4)	2 (1 to 3)		
Operation end	1 (1 to 3)	1 (1 to 2)		
Operation end + 12 hours	45 (36 to 58.5)	44 (36.5 to 59.5)		
Operation end + 24 hours	132 (123 to 183)	167.5 (133.5 to 180)		
Operation end + 48 hours	241.5 (199 to 287)	249 (184 to 290)		
Operation end + 72 hours	232 (174 to 295)	249 (198 to 284)		
Operation end + 120 hours	91.5 (61 to 124)	97 (63 to 132)		

Statistical analyses

Statistical analysis title	C-reactive protein
Comparison groups	Volume replacement therapy v Usual care
Number of subjects included in analysis	54
Analysis specification	Pre-specified
Analysis type	superiority
P-value	= 0.9353
Method	Regression, Linear
Parameter estimate	Geometric mean ratio
Point estimate	1
Confidence interval	
level	95 %
sides	2-sided
lower limit	0.89
upper limit	1.11
Variability estimate	Standard error of the mean
Dispersion value	0.05

Secondary: Troponin T

End point title	Troponin T

End point description:

End point type	Secondary

End point timeframe:

Measured preoperatively (baseline, pre-trial intervention) and at 0, 12, 24, 48, 72 and 120 hours after the operation.

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	26	28		
Units: µg/L				
median (inter-quartile range (Q1-Q3))				
Pre-operative	12 (9.5 to 13.5)	9 (6 to 21)		
Operation end	166 (86 to 267)	129.5 (76.5 to 226.5)		
Operation end + 12 hours	234.5 (130 to 364)	197 (80 to 320)		
Operation end + 24 hours	200 (103 to 258)	177 (70 to 249)		
Operation end + 48 hours	145 (87 to 193)	142 (68 to 225)		
Operation end + 72 hours	123 (75.5 to 189.5)	132 (70 to 179)		
Operation end + 120 hours	89.5 (54 to 158)	66 (34 to 111)		

Statistical analyses

Statistical analysis title	Troponin T
Comparison groups	Volume replacement therapy v Usual care
Number of subjects included in analysis	54
Analysis specification	Pre-specified
Analysis type	superiority
P-value	= 0.4923
Method	Regression, Linear
Parameter estimate	Geometric mean ratio
Point estimate	1.14
Confidence interval	
level	95 %
sides	2-sided
lower limit	0.8
upper limit	1.64
Variability estimate	Standard error of the mean
Dispersion value	0.21

Secondary: N-acetyl glucosaminidase (NAG)

End point title	N-acetyl glucosaminidase (NAG)

End point description:

End point type	Secondary

End point timeframe:

Measured in urine samples collected preoperatively (baseline, pre-trial intervention) and at 0, 24, 48 and 120 hours

End point values	Volume replacement therapy	Usual care	Oral treatment only - VRT group	Oral treatment only - usual care group
Subject group type	Reporting group	Reporting group	Subject analysis set	Subject analysis set
Number of subjects analysed	36	37	22	18
Units: U/g				
median (inter-quartile range (Q1-Q3))				
Pre-operative	1.9 (1.3 to 3.6)	2.4 (1.7 to 3.9)	1.8 (1.1 to 2.9)	2.1 (1.5 to 3.9)
Operation end	4.3 (2.2 to 7.7)	4.6 (1.9 to 7.3)	3.5 (2 to 6.7)	4.1 (1.7 to 5.7)
Operation end + 24 hours	8.6 (5.9 to 15.1)	6.8 (4.7 to 14.9)	8.6 (6 to 13.5)	6.2 (4.2 to 12.3)
Operation end + 48 hours	7.8 (3.3 to 19.4)	8.4 (2.3 to 15.4)	5.3 (2.9 to 12.1)	6.0 (2.2 to 12.8)
Operation end + 120 hours	7 (4.1 to 9.4)	6 (3.9 to 9.8)	5.9 (3.8 to 8.6)	4.8 (3.6 to 6.2)

End point values	Insulin +/- oral treatment - VRT group	Insulin +/- oral treatment - usual care group		
Subject group type	Subject analysis set	Subject analysis set		
Number of subjects analysed	14	19		
Units: U/g				
median (inter-quartile range (Q1-Q3))				
Pre-operative	2.1 (1.7 to 6.7)	3 (1.9 to 4.5)		
Operation end	4.6 (2.8 to 9.8)	5.9 (3.0 to 10.4)		
Operation end + 24 hours	8.9 (5.9 to 19.2)	10.5 (5.0 to 20.7)		
Operation end + 48 hours	17.4 (6.5 to 26.4)	9.7 (5.2 to 19.1)		
Operation end + 120 hours	9.3 (7.3 to 13.4)	9.3 (6.5 to 14.3)		

Statistical analyses

Statistical analysis title	N-acetyl glucosaminidase (NAG)
Comparison groups	Volume replacement therapy v Usual care
Number of subjects included in analysis	73
Analysis specification	Pre-specified
Analysis type	superiority
P-value	= 0.4912
Method	Regression, Linear
Parameter estimate	Geometric mean ratio
Point estimate	1.09
Confidence interval	
level	95 %
sides	2-sided
lower limit	0.85
upper limit	1.4
Variability estimate	Standard error of the mean
Dispersion value	0.14

Statistical analysis title	NAG - oral treatment only
Statistical analysis description:	
Comparing NAG between VRT and usual care groups in patients receiving oral treatment only for their diabetes	
Comparison groups	Oral treatment only - VRT group v Oral treatment only - usual care group
Number of subjects included in analysis	40
Analysis specification	Pre-specified
Analysis type	superiority
Method	Mixed models analysis
Parameter estimate	Geometric mean ratio
Point estimate	1.25
Confidence interval	
level	95 %
sides	2-sided
lower limit	0.91
upper limit	1.72
Variability estimate	Standard error of the mean
Dispersion value	0.2

Statistical analysis title	NAG - insulin +/- oral treatment
Statistical analysis description:	
Comparing NAG between VRT and usual care groups in patients receiving insulin +/- oral treatment for their diabetes	
Comparison groups	Insulin +/- oral treatment - VRT group v Insulin +/- oral treatment - usual care group

Number of subjects included in analysis	33
Analysis specification	Pre-specified
Analysis type	superiority
Method	Mixed models analysis
Parameter estimate	Geometric mean ratio
Point estimate	0.78
Confidence interval	
level	95 %
sides	2-sided
lower limit	0.48
upper limit	1.27
Variability estimate	Standard error of the mean
Dispersion value	0.19

Secondary: CROQ core total score

End point title	CROQ core total score
End point description:	
End point type	Secondary
End point timeframe:	
Pre-operatively and 3 months post-randomisation	

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	60	61		
Units: N/A				
median (inter-quartile range (Q1-Q3))				
Pre-operative	47.2 (40.1 to 52)	47.6 (42.1 to 52)		
3 months post-operative	54 (48.3 to 56.6)	53.6 (47.9 to 56.4)		

Statistical analyses

Statistical analysis title	CROQ score total score
Comparison groups	Volume replacement therapy v Usual care
Number of subjects included in analysis	121
Analysis specification	Pre-specified
Analysis type	superiority
P-value	= 0.5967
Method	Mixed models analysis
Parameter estimate	Mean difference (final values)
Point estimate	0.66

Confidence interval	
level	95 %
sides	2-sided
lower limit	-1.78
upper limit	3.1
Variability estimate	Standard error of the mean
Dispersion value	1.24

Secondary: CROQ symptoms score

End point title	CROQ symptoms score
End point description:	
End point type	Secondary
End point timeframe:	
Pre-operative and 3 months post-operative	

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	60	61		
Units: N/A				
median (inter-quartile range (Q1-Q3))				
Pre-operative	69 (50 to 85.7)	68.8 (48.2 to 85.7)		
3 months post-operative	92.9 (85.7 to 100)	92.9 (79.1 to 96.4)		

Statistical analyses

Statistical analysis title	CROQ symptoms score
Comparison groups	Volume replacement therapy v Usual care
Number of subjects included in analysis	121
Analysis specification	Pre-specified
Analysis type	superiority
P-value	= 0.5901
Method	Mixed models analysis
Parameter estimate	Mean difference (final values)
Point estimate	1.57
Confidence interval	
level	95 %
sides	2-sided
lower limit	-4.12
upper limit	7.26

Variability estimate	Standard error of the mean
Dispersion value	2.9

Secondary: CROQ physical functioning score

End point title	CROQ physical functioning score

End point description:

End point type	Secondary

End point timeframe:

Pre-operative and 3 months post-operative

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	59	61		
Units: N/A				
median (inter-quartile range (Q1-Q3))				
Pre-operative	56.3 (31.3 to 91.7)	56.3 (25 to 85.7)		
3 months post-operative	90.7 (65.7 to 100)	83.5 (62.5 to 93.8)		

Statistical analyses

Statistical analysis title	CROQ physical functioning score
Comparison groups	Volume replacement therapy v Usual care
Number of subjects included in analysis	120
Analysis specification	Pre-specified
Analysis type	superiority
P-value	= 0.993
Method	Mixed models analysis
Parameter estimate	Mean difference (final values)
Point estimate	-0.04
Confidence interval	
level	95 %
sides	2-sided
lower limit	-9.61
upper limit	9.52
Variability estimate	Standard error of the mean
Dispersion value	4.88

Secondary: CROQ cognitive functioning score	
End point title	CROQ cognitive functioning score
End point description:	

End point type	Secondary
End point timeframe:	
Pre-operative and 3 months post-operative	

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	60	61		
Units: N/A				
median (inter-quartile range (Q1-Q3))				
Pre-operative	80 (53.3 to 100)	86.7 (60 to 100)		
3 months post-operative	83.4 (63.4 to 100)	90 (60 to 100)		

Statistical analyses

Statistical analysis title	CROQ cognitive functioning score
Comparison groups	Volume replacement therapy v Usual care
Number of subjects included in analysis	121
Analysis specification	Pre-specified
Analysis type	superiority
P-value	= 0.6638
Method	Mixed models analysis
Parameter estimate	Mean difference (final values)
Point estimate	1.91
Confidence interval	
level	95 %
sides	2-sided
lower limit	-6.62
upper limit	10.45
Variability estimate	Standard error of the mean
Dispersion value	4.35

Secondary: CROQ psychosocial functioning score	
End point title	CROQ psychosocial functioning score
End point description:	

End point type	Secondary

End point timeframe:
Pre-operative and 3 months post-operative

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	60	61		
Units: N/A				
median (inter-quartile range (Q1-Q3))				
Pre-operative	62.5 (39.3 to 80.4)	68.8 (47.3 to 82.1)		
3 months post-operative	85.7 (62.5 to 92.9)	85.7 (67.9 to 92.9)		

Statistical analyses

Statistical analysis title	CROQ psychosocial functioning score
Comparison groups	Volume replacement therapy v Usual care
Number of subjects included in analysis	121
Analysis specification	Pre-specified
Analysis type	superiority
P-value	= 0.2563
Method	Mixed models analysis
Parameter estimate	Mean difference (final values)
Point estimate	4.7
Confidence interval	
level	95 %
sides	2-sided
lower limit	-3.31
upper limit	12.71
Variability estimate	Standard error of the mean
Dispersion value	4.09

Secondary: CROQ satisfaction score

End point title	CROQ satisfaction score

End point description:

End point type	Secondary

End point timeframe:
3 months post-operative

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	51	53		
Units: N/A				
median (inter-quartile range (Q1-Q3))	86.7 (75 to 100)	79.2 (62.5 to 91.7)		

Statistical analyses

Statistical analysis title	CROQ satisfaction score
Statistical analysis description:	
Comaparing CROQ satisfaction score between VRT and usual care groups at 3 months post-operation. Multiple imputation used to account for missing data.	
Comparison groups	Usual care v Volume replacement therapy
Number of subjects included in analysis	104
Analysis specification	Pre-specified
Analysis type	superiority
P-value	= 0.123
Method	Regression, Linear
Parameter estimate	Mean difference (final values)
Point estimate	5.65
Confidence interval	
level	95 %
sides	2-sided
lower limit	-1.56
upper limit	12.86
Variability estimate	Standard error of the mean
Dispersion value	3.63

Secondary: CROQ adverse effects score

End point title	CROQ adverse effects score
End point description:	
Adverse effects score categorised into quartiles and summarised	
End point type	Secondary
End point timeframe:	
3 months post-operative	

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	51	54		
Units: Subjects				
Quartile 1: <72.7	8	12		
Quartile 2: ≥ 72.7 & < 84.1	13	14		
Quartile 3: ≥ 84.1 & < 93.2	14	12		
Quartile 4: ≥ 93.2	16	16		

Statistical analyses

Statistical analysis title	CROQ adverse effects score

Statistical analysis description:

CROQ adverse effects score categorised into quartiles and compared between VRT and usual care groups

Comparison groups	Volume replacement therapy v Usual care
Number of subjects included in analysis	105
Analysis specification	Pre-specified
Analysis type	superiority
P-value	= 0.52
Method	Ordered logistic regression
Parameter estimate	Odds ratio (OR)
Point estimate	1.27
Confidence interval	
level	95 %
sides	2-sided
lower limit	0.38
upper limit	2.15
Variability estimate	Standard error of the mean
Dispersion value	0.45

Secondary: Cost of healthcare resources

End point title	Cost of healthcare resources

End point description:

Costs assessed included duration of operation, intensive care unit (ICU)/high dependency unit (HDU) and ward stay, additional interventions to treat complications, readmissions and re-operations.

End point type	Secondary

End point timeframe:

During hospital stay

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	60	60		
Units: Pounds				
median (inter-quartile range (Q1-Q3))	11820.8 (10878.4 to 13798.1)	11501.1 (10487 to 13815.2)		

Statistical analyses

Statistical analysis title	Cost of healthcare resources
Comparison groups	Usual care v Volume replacement therapy
Number of subjects included in analysis	120
Analysis specification	Pre-specified
Analysis type	superiority
P-value	= 0.3703
Method	Regression, Linear
Parameter estimate	Geometric mean ratio
Point estimate	1.04
Confidence interval	
level	95 %
sides	2-sided
lower limit	0.96
upper limit	1.12
Variability estimate	Standard error of the mean
Dispersion value	0.04

Other pre-specified: Duration of operation

End point title	Duration of operation

End point description:

End point type	Other pre-specified

End point timeframe:

Duration of operation

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	60	61		
Units: hours				
arithmetic mean (standard deviation)	3 (± 0.9)	4 (± 1.0)		

Statistical analyses

No statistical analyses for this end point

Other pre-specified: Duration of ICU/HDU stay

End point title	Duration of ICU/HDU stay

End point description:

End point type	Other pre-specified

End point timeframe:

Length of ICU/HDU stay

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	60	60		
Units: hours				
median (inter-quartile range (Q1-Q3))	93 (58 to 121.5)	94 (66.8 to 123.4)		

Statistical analyses

No statistical analyses for this end point

Other pre-specified: Duration of ward stay

End point title	Duration of ward stay

End point description:

End point type	Other pre-specified

End point timeframe:

Length of ward stay

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	60	61		
Units: hours				
median (inter-quartile range (Q1-Q3))	74 (49.9 to 112.4)	72 (28 to 122.1)		

Statistical analyses

No statistical analyses for this end point

Other pre-specified: Duration of ventilation

End point title	Duration of ventilation

End point description:

End point type	Other pre-specified

End point timeframe:

Duration of in-hospital ventilation

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	60	61		
Units: hours				
median (inter-quartile range (Q1-Q3))	6 (4.6 to 10)	7 (4.8 to 9.6)		

Statistical analyses

No statistical analyses for this end point

Other pre-specified: Any transfusion

End point title	Any transfusion

End point description:

End point type	Other pre-specified

End point timeframe:

In-hospital

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	60	61		
Units: Subjects				
Yes	20	16		
No	40	45		

Statistical analyses

No statistical analyses for this end point

Other pre-specified: If transfusion, units received

End point title	If transfusion, units received

End point description:

End point type	Other pre-specified

End point timeframe:

Units of blood received during transfusion

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	20	16		
Units: units				
median (inter-quartile range (Q1-Q3))	1 (1 to 2)	3 (1 to 6)		

Statistical analyses

No statistical analyses for this end point

Other pre-specified: Activated factor VII used

End point title	Activated factor VII used

End point description:

End point type	Other pre-specified

End point timeframe:

In-hospital

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	60	61		
Units: Subjects				
Yes	1	0		
No	59	61		

Statistical analyses

No statistical analyses for this end point

Other pre-specified: Colloid/crystalloid received

End point title	Colloid/crystalloid received

End point description:

End point type	Other pre-specified

End point timeframe:

In-hospital

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	60	61		
Units: Subjects				
Yes	60	61		
No	0	0		

Statistical analyses

No statistical analyses for this end point

Other pre-specified: Discharge destination

End point title	Discharge destination

End point description:

End point type	Other pre-specified

End point timeframe:

Hospital discharge

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	60	61		
Units: Subjects				
Home	57	54		
Other ward within hospital	0	2		
Other hospital	3	2		
Other (e.g. nursing home)	0	2		
Patient died	0	1		

Statistical analyses

No statistical analyses for this end point

Other pre-specified: Readmitted to hospital

End point title	Readmitted to hospital

End point description:

End point type	Other pre-specified

End point timeframe:

Any hospital readmission within 3 months post-operation

End point values	Volume replacement therapy	Usual care		
Subject group type	Reporting group	Reporting group		
Number of subjects analysed	60	60		
Units: Subjects				
Yes	11	8		
No	49	48		
Unknown	0	4		

Statistical analyses

No statistical analyses for this end point

Adverse events

Adverse events information

Timeframe for reporting adverse events:

In-hospital and up to 3 months post-operatively

Adverse event reporting additional description:

All expected adverse events reported as event names (not put through medical dictionary).
Unexpected adverse events reported using MedDRA dictionary.
For all events, 'non-serious adverse events' includes ALL events (serious and non-serious). This is consistent with the trial publication.

Assessment type	Systematic

Dictionary used

Dictionary name	Not used
Dictionary version	1

Reporting groups

Reporting group title	Volume replacement therapy

Reporting group description:

CABG with or without cardiopulmonary bypass (CPB), with preoperative volume replacement therapy (1 ml/kg/hr of Hartmann’s solution for 12 consecutive hours prior to surgery).

Reporting group title	Usual care

Reporting group description:

CABG with or without CPB with conventional preoperative management (no preoperative fluids).

Serious adverse events	Volume replacement therapy	Usual care	
Total subjects affected by serious adverse events			
subjects affected / exposed	23 / 60 (38.33%)	22 / 61 (36.07%)	
number of deaths (all causes)	0	2	
number of deaths resulting from adverse events	0	2	
Vascular disorders			
Haemorrhage			
subjects affected / exposed	1 / 60 (1.67%)	0 / 61 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Deep vein thrombosis			
subjects affected / exposed	1 / 60 (1.67%)	0 / 61 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Surgical and medical procedures			
Haemofiltration/dialysis			

subjects affected / exposed	0 / 60 (0.00%)	3 / 61 (4.92%)	
occurrences causally related to treatment / all	0 / 0	0 / 3	
deaths causally related to treatment / all	0 / 0	0 / 0	
Reoperation			
subjects affected / exposed	1 / 60 (1.67%)	3 / 61 (4.92%)	
occurrences causally related to treatment / all	0 / 1	0 / 3	
deaths causally related to treatment / all	0 / 0	0 / 0	
Re-intubation and ventilation			
subjects affected / exposed	1 / 60 (1.67%)	3 / 61 (4.92%)	
occurrences causally related to treatment / all	0 / 1	0 / 3	
deaths causally related to treatment / all	0 / 0	0 / 0	
Inotropes			
subjects affected / exposed	1 / 60 (1.67%)	1 / 61 (1.64%)	
occurrences causally related to treatment / all	0 / 1	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Mask CPAP			
subjects affected / exposed	1 / 60 (1.67%)	0 / 61 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Pulmonary artery catheter			
subjects affected / exposed	0 / 60 (0.00%)	1 / 61 (1.64%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
General disorders and administration site conditions			
Death - unknown cause			
subjects affected / exposed	0 / 60 (0.00%)	1 / 61 (1.64%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 1	
Reproductive system and breast disorders			
Tachypnoea			
subjects affected / exposed	0 / 60 (0.00%)	1 / 61 (1.64%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	

Respiratory, thoracic and mediastinal disorders			
Acute respiratory distress syndrome			
subjects affected / exposed	0 / 60 (0.00%)	1 / 61 (1.64%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Pleural effusion/pneumothorax			
subjects affected / exposed	2 / 60 (3.33%)	4 / 61 (6.56%)	
occurrences causally related to treatment / all	0 / 2	0 / 4	
deaths causally related to treatment / all	0 / 0	0 / 0	
Pulmonary embolus			
subjects affected / exposed	1 / 60 (1.67%)	0 / 61 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Dyspnoea			
subjects affected / exposed	1 / 60 (1.67%)	0 / 61 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Epistaxis			
subjects affected / exposed	1 / 60 (1.67%)	0 / 61 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Investigations			
Blood potassium increased			
subjects affected / exposed	1 / 60 (1.67%)	0 / 61 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Injury, poisoning and procedural complications			
Fall			
subjects affected / exposed	0 / 60 (0.00%)	1 / 61 (1.64%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Cardiac disorders			
Cardiac arrest			

subjects affected / exposed	1 / 60 (1.67%)	1 / 61 (1.64%)	
occurrences causally related to treatment / all	0 / 1	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 1	
Myocardial infarction			
subjects affected / exposed	2 / 60 (3.33%)	1 / 61 (1.64%)	
occurrences causally related to treatment / all	0 / 2	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Supraventricular tachycardia/Atrial fibrillation			
subjects affected / exposed	5 / 60 (8.33%)	1 / 61 (1.64%)	
occurrences causally related to treatment / all	0 / 5	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Ventricular fibrillation/Ventricular tachycardia			
subjects affected / exposed	1 / 60 (1.67%)	0 / 61 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Sinus tachycardia			
subjects affected / exposed	0 / 60 (0.00%)	1 / 61 (1.64%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Pacing			
subjects affected / exposed	1 / 60 (1.67%)	0 / 61 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Pericardial effusion/haemorrhage			
subjects affected / exposed	2 / 60 (3.33%)	1 / 61 (1.64%)	
occurrences causally related to treatment / all	0 / 2	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Cardiac failure congestive			
subjects affected / exposed	1 / 60 (1.67%)	0 / 61 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Chest pain			

subjects affected / exposed	0 / 60 (0.00%)	1 / 61 (1.64%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Nervous system disorders			
Transient ischaemic attack			
subjects affected / exposed	1 / 60 (1.67%)	0 / 61 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Cerebrovascular accident			
subjects affected / exposed	0 / 60 (0.00%)	1 / 61 (1.64%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Seizure			
subjects affected / exposed	0 / 60 (0.00%)	1 / 61 (1.64%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Gastrointestinal disorders			
Hiatus hernia			
subjects affected / exposed	0 / 60 (0.00%)	1 / 61 (1.64%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Peptic ulcer/GI bleed/perforation			
subjects affected / exposed	1 / 60 (1.67%)	1 / 61 (1.64%)	
occurrences causally related to treatment / all	0 / 1	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Skin and subcutaneous tissue disorders			
Skin ulcer			
subjects affected / exposed	0 / 60 (0.00%)	1 / 61 (1.64%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Renal and urinary disorders			
Urinary retention			

subjects affected / exposed	1 / 60 (1.67%)	0 / 61 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Acute kidney injury			
subjects affected / exposed	18 / 60 (30.00%)	13 / 61 (21.31%)	
occurrences causally related to treatment / all	0 / 18	0 / 13	
deaths causally related to treatment / all	0 / 0	0 / 0	
Endocrine disorders			
Hypoglycaemia			
subjects affected / exposed	0 / 60 (0.00%)	1 / 61 (1.64%)	
occurrences causally related to treatment / all	0 / 0	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	
Musculoskeletal and connective tissue disorders			
Musculoskeletal pain			
subjects affected / exposed	2 / 60 (3.33%)	0 / 61 (0.00%)	
occurrences causally related to treatment / all	0 / 2	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Musculoskeketal chest pain			
subjects affected / exposed	2 / 60 (3.33%)	0 / 61 (0.00%)	
occurrences causally related to treatment / all	0 / 2	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	
Infections and infestations			
Sepsis			
subjects affected / exposed	2 / 60 (3.33%)	6 / 61 (9.84%)	
occurrences causally related to treatment / all	0 / 2	0 / 11	
deaths causally related to treatment / all	0 / 0	0 / 0	
Respiratory tract infection			
subjects affected / exposed	5 / 60 (8.33%)	4 / 61 (6.56%)	
occurrences causally related to treatment / all	0 / 6	0 / 7	
deaths causally related to treatment / all	0 / 0	0 / 0	
Chest infection			
subjects affected / exposed	4 / 60 (6.67%)	1 / 61 (1.64%)	
occurrences causally related to treatment / all	0 / 4	0 / 1	
deaths causally related to treatment / all	0 / 0	0 / 0	

Wound infection			
subjects affected / exposed	3 / 60 (5.00%)	3 / 61 (4.92%)	
occurrences causally related to treatment / all	0 / 3	0 / 3	
deaths causally related to treatment / all	0 / 0	0 / 0	
Wound dehiscence			
subjects affected / exposed	2 / 60 (3.33%)	3 / 61 (4.92%)	
occurrences causally related to treatment / all	0 / 2	0 / 4	
deaths causally related to treatment / all	0 / 0	0 / 0	
Osteomyellitis			
subjects affected / exposed	1 / 60 (1.67%)	0 / 61 (0.00%)	
occurrences causally related to treatment / all	0 / 1	0 / 0	
deaths causally related to treatment / all	0 / 0	0 / 0	

Frequency threshold for reporting non-serious adverse events: 0 %

Non-serious adverse events	Volume replacement therapy	Usual care	
Total subjects affected by non-serious adverse events			
subjects affected / exposed	53 / 60 (88.33%)	54 / 61 (88.52%)	
Vascular disorders			
Haemorrhage			
subjects affected / exposed	1 / 60 (1.67%)	0 / 61 (0.00%)	
occurrences (all)	1	0	
Deep vein thrombosis			
subjects affected / exposed	1 / 60 (1.67%)	0 / 61 (0.00%)	
occurrences (all)	1	0	
Surgical and medical procedures			
Haemofiltration/dialysis			
subjects affected / exposed	0 / 60 (0.00%)	3 / 61 (4.92%)	
occurrences (all)	0	3	
Re-operation			
subjects affected / exposed	1 / 60 (1.67%)	3 / 61 (4.92%)	
occurrences (all)	1	3	
Re-intubation and ventilation			
subjects affected / exposed	1 / 60 (1.67%)	3 / 61 (4.92%)	
occurrences (all)	1	3	

Inotropes			
subjects affected / exposed	19 / 60 (31.67%)	32 / 61 (52.46%)	
occurrences (all)	20	32	
Vasodilation procedure			
subjects affected / exposed	21 / 60 (35.00%)	15 / 61 (24.59%)	
occurrences (all)	21	15	
IABP			
subjects affected / exposed	1 / 60 (1.67%)	1 / 61 (1.64%)	
occurrences (all)	1	1	
Mask CPAP			
subjects affected / exposed	7 / 60 (11.67%)	12 / 61 (19.67%)	
occurrences (all)	7	12	
Pulmonary artery catheter			
subjects affected / exposed	1 / 60 (1.67%)	1 / 61 (1.64%)	
occurrences (all)	1	1	
General disorders and administration site conditions			
Oedema			
subjects affected / exposed	0 / 60 (0.00%)	1 / 61 (1.64%)	
occurrences (all)	0	1	
Respiratory, thoracic and mediastinal disorders			
Acute respiratory distress syndrome			
subjects affected / exposed	0 / 60 (0.00%)	1 / 61 (1.64%)	
occurrences (all)	0	1	
Pleural effusion/pneumothorax			
subjects affected / exposed	4 / 60 (6.67%)	4 / 61 (6.56%)	
occurrences (all)	4	4	
Pulmonary embolism			
subjects affected / exposed	1 / 60 (1.67%)	0 / 61 (0.00%)	
occurrences (all)	1	0	
Dyspnoea			
subjects affected / exposed	1 / 60 (1.67%)	0 / 61 (0.00%)	
occurrences (all)	1	0	
Tachypnoea			
subjects affected / exposed	0 / 60 (0.00%)	1 / 61 (1.64%)	
occurrences (all)	0	1	
Epistaxis			

subjects affected / exposed	1 / 60 (1.67%)	0 / 61 (0.00%)	
occurrences (all)	1	0	
Investigations			
Blood potassium increased			
subjects affected / exposed	1 / 60 (1.67%)	0 / 61 (0.00%)	
occurrences (all)	1	0	
Injury, poisoning and procedural complications			
Fall			
subjects affected / exposed	0 / 60 (0.00%)	1 / 61 (1.64%)	
occurrences (all)	0	1	
Cardiac disorders			
Cardiac arrest			
subjects affected / exposed	1 / 60 (1.67%)	1 / 61 (1.64%)	
occurrences (all)	1	1	
Myocardial infarction			
subjects affected / exposed	7 / 60 (11.67%)	6 / 61 (9.84%)	
occurrences (all)	7	6	
Supraventricular tachycardia/Atrial fibrillation			
subjects affected / exposed	23 / 60 (38.33%)	20 / 61 (32.79%)	
occurrences (all)	23	20	
Ventricular fibrillation/Ventricular tachycardia			
subjects affected / exposed	1 / 60 (1.67%)	0 / 61 (0.00%)	
occurrences (all)	1	0	
Pacing			
subjects affected / exposed	4 / 60 (6.67%)	6 / 61 (9.84%)	
occurrences (all)	4	6	
Pericardial effusion/haemorrhage			
subjects affected / exposed	2 / 60 (3.33%)	1 / 61 (1.64%)	
occurrences (all)	2	1	
Cardiac failure congestive			
subjects affected / exposed	1 / 60 (1.67%)	0 / 61 (0.00%)	
occurrences (all)	1	0	
Chest pain			
subjects affected / exposed	0 / 60 (0.00%)	1 / 61 (1.64%)	
occurrences (all)	0	1	

Low cardiac output syndrome subjects affected / exposed occurrences (all)	1 / 60 (1.67%) 1	2 / 61 (3.28%) 2	
Nervous system disorders Transient ischaemic attack subjects affected / exposed occurrences (all) Cerebrovascular accident subjects affected / exposed occurrences (all) Seizure subjects affected / exposed occurrences (all)	 1 / 60 (1.67%) 1 0 / 60 (0.00%) 0 0 / 60 (0.00%) 0	 0 / 61 (0.00%) 0 1 / 61 (1.64%) 1 1 / 61 (1.64%) 1	
Gastrointestinal disorders Hiatus hernia subjects affected / exposed occurrences (all) Peptic ulcer/GI bleed/perforation subjects affected / exposed occurrences (all)	 0 / 60 (0.00%) 0 1 / 60 (1.67%) 1	 1 / 61 (1.64%) 1 2 / 61 (3.28%) 2	
Skin and subcutaneous tissue disorders Skin ulcer subjects affected / exposed occurrences (all)	 0 / 60 (0.00%) 0	 1 / 61 (1.64%) 1	
Renal and urinary disorders Urinary retention subjects affected / exposed occurrences (all) Acute kidney injury subjects affected / exposed occurrences (all)	 1 / 60 (1.67%) 1 18 / 60 (30.00%) 18	 0 / 61 (0.00%) 0 13 / 61 (21.31%) 13	
Endocrine disorders Hypoglycaemia subjects affected / exposed occurrences (all)	 0 / 60 (0.00%) 0	 1 / 61 (1.64%) 1	
Musculoskeletal and connective tissue disorders			

Musculoskeletal pain			
subjects affected / exposed	2 / 60 (3.33%)	0 / 61 (0.00%)	
occurrences (all)	2	0	
Musculoskeletal chest pain			
subjects affected / exposed	2 / 60 (3.33%)	0 / 61 (0.00%)	
occurrences (all)	2	0	
Infections and infestations			
Sepsis			
subjects affected / exposed	13 / 60 (21.67%)	24 / 61 (39.34%)	
occurrences (all)	12	17	
Respiratory infection			
subjects affected / exposed	17 / 60 (28.33%)	19 / 61 (31.15%)	
occurrences (all)	14	15	
Chest infection			
subjects affected / exposed	4 / 60 (6.67%)	1 / 61 (1.64%)	
occurrences (all)	4	1	
Wound infection			
subjects affected / exposed	3 / 60 (5.00%)	3 / 61 (4.92%)	
occurrences (all)	3	3	
Wound dehiscence			
subjects affected / exposed	2 / 60 (3.33%)	4 / 61 (6.56%)	
occurrences (all)	2	3	
Osteomyelitis			
subjects affected / exposed	1 / 60 (1.67%)	0 / 61 (0.00%)	
occurrences (all)	1	0	

More information

Substantial protocol amendments (globally)

Were there any global substantial amendments to the protocol? Yes

Date	Amendment
24 October 2011	Update to primary endpoint and to safety section
16 January 2013	Addition of new outcomes and timepoints for outcomes; sample size amended for tubular injury outcome; clarification added to the dosage and regimen section for the study medication; clarification of the end of trial definition; amendment of wording regarding collection, storage, labelling etc. of samples; amendment regarding documentation of drug administration; amendment regarding process for reporting SAEs; amendment of list of expected adverse events.
04 September 2013	Clarification that due to time restraints the pre-op CROQ can be completed alongside randomisation as long as the CROQ is completed prior to informing the patient of the treatment allocation. Clarification of the rule on randomisation if the pre-op creatinine result is not available in time. Sample size amended for tubular injury outcome and for secondary outcomes (i) to (l). MicroRNA and other biochemical predictors will also be measured in urine. Key data collection points table changed to include other biochemical predictors of health outcome for blood samples and to include microRNA and other biochemical predictors of health outcome in urine samples.

Notes:

Interruptions (globally)

Were there any global interruptions to the trial? No

Limitations and caveats

Limitations of the trial such as small numbers of subjects analysed or technical problems leading to unreliable data.

None reported

Notes:

Online references

http://www.ncbi.nlm.nih.gov/pubmed/31539025