Supplemental Material

Supplemental Appendix 1: Search Strategy

Ovid MEDLINE(R) In-Process & Other Non-Indexed Citations and Ovid MEDLINE(R) 1946 to Present

1.	exp Contrast Media/	94047
2.	exp Kidney Diseases/	422318
3.	1 and 2	6594
4.	(contrast adj4 nephropathy).tw.	1630
5.	(radiocontrast adj4 nephropathy).tw.	209
6.	3 or 4 or 5	7126
7.	Risk Assessment/	181868
8.	risk factors/	585036
9.	(risk adj3 model*).tw.	12732
10.	score*.tw.	539861
11.	Forecasting/	71486
12.	prognostic factor*.tw.	63831
13.	"Predictive Value of Tests"/	148021
14.	predict*.tw.	995239
15.	Statistics as Topic/	83751
16.	statistic*.tw.	709624
17.	exp Regression Analysis/	308099
18.	regression*.tw.	435202
19.	(logistic adj2 model*).tw.	36450
20.	multivariate analysis/	89248
21.	(multivariate adj3 analysis).tw.	118001
22.	sn.fs.	536852
23.	exp mathematical concepts/	744732
24.	exp Models, Biological/	637175
25.	exp models, statistical/	285177

26.	area under curve/	27203
27.	algorithm*.tw.	144845
28.	equation*.tw.	119776
29.	7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24 or 25 or 26 or 27 or 28	4359075
30.	6 and 29	2419
31.	remove duplicates from 30	2388
32.	remove duplicates from 30	2388
33.	limit 32 to yr="2013 -Current"	394

CINAHL Plus with Fulltext

S30   S6 AND S28
Limiters - Published Date: 20130101-20151231
Search modes - Boolean/Phrase   (129)
S29   S6 AND S28
Search modes - Boolean/Phrase   (548) S28   S7 OR S8 OR S9 OR S10 OR S11 OR S12 OR S13 OR S14 OR S15 OR S16 OR S17 OR S18 OR S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25 OR S26 OR S27   Search modes - Boolean/Phrase (940,296)
S27   equation*
Search modes - Boolean/Phrase   (12,439)
S26   algorithm*
Search modes - Boolean/Phrase   (27,002)
S25   (MH "algorithms")
Search modes - Boolean/Phrase   (20,660)
S24   (MH "models, statistical")

Search modes - Boolean/Phrase (18,559)
S23 (MH "models, biological")
Search modes - Boolean/Phrase 36,422)
S22 (MH "mathematics")
Search modes - Boolean/Phrase (9,431)
S21 multivariate n3 analysis
Search modes - Boolean/Phrase (58,327)
S20 (MH "multivariate analysis")
Search modes - Boolean/Phrase (38,608)
S19 logistic n2 model*
Search modes - Boolean/Phrase (8,116)
S18 regression*
Search modes - Boolean/Phrase (210,240)
S17 (MH "regression+")
Search modes - Boolean/Phrase (181,480)
S16 statistic*
Search modes - Boolean/Phrase (583,369)
S15 (MH "statistics")
Search modes - Boolean/Phrase (8,229)
S14 predict*
Search modes - Boolean/Phrase (159,083)
S13 (MH "predictive value of tests")
Search modes - Boolean/Phrase (30,587)
S12 prognostic factor*
Search modes - Boolean/Phrase (5,251)
S11 (MH "forecasting")
Search modes - Boolean/Phrase (10,425)
S10 score*
Search modes - Boolean/Phrase (113,827)
S9 risk n3 model*
Search modes - Boolean/Phrase (3,487)

S8   (MH "risk factors")
Search modes - Boolean/Phrase   (105,271)
S7   (MH "risk assessment")
Search modes - Boolean/Phrase   (54,144)
S6   S3 OR S4 OR S5
Search modes - Boolean/Phrase   (1,410)
S5   radiocontrast n4 nephropathy
Search modes - Boolean/Phrase   (37)
S4   contrast n4 nephropathy
Search modes - Boolean/Phrase   (426)
S3   S1 AND S2
Search modes - Boolean/Phrase   (1,326)
S2   (MH "kidney diseases+")
Search modes - Boolean/Phrase   (51,152)
S1   (MH "contrast media+")
Search modes - Boolean/Phrase   (12,685)

Embase Classic+Embase 1947 to 2015 Week 10

1	contrast induced nephropathy/	2493
2	(contrast adj4 nephropathy).tw.	2656
3	(radiocontrast adj4 nephropathy).tw.	242
4	1 or 2 or 3	3708
5	risk assessment/	351014
6	risk factor/	658874
7	(risk adj3 model*).tw.	17192
8	score*.tw.	778242
9	prognostic factor*.tw.	89510
10	prediction/	237512

11	predict*.tw.	1266079
12	exp statistics/	318716
13	statistic*.tw.	998646
14	exp regression analysis/	269417
15	regression*.tw.	590589
16	(logistic adj2 model*).tw.	49313
17	multivariate analysis/	110365
18	(multivariate adj3 analysis).tw.	167128
19	mathematical phenomena/	1825
20	exp biological model/	979327
21	statistical model/	107937
22	area under the curve/	80886
23	algorithm*.tw.	169460
24	equation*.tw.	145853
25	5 or 6 or 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 or 23 or 24	5073659
26	4 and 25	1956
27	limit 26 to embase	1828
28	remove duplicates from 27	1815
29	limit 28 to yr="2013 -Current"	568

Supplementary Appendix 2: Criteria for measuring risk of bias and clinical usefulness

Bias	Areas to Consider
Study participation	- Sample population matches the population of interest - Inclusion and exclusion criteria - Sampling frame and recruitment strategy, including methods to identify the study sample and the period/place of recruitment - Adequate participation in the study by eligible patients - Characteristics of baseline study sample
Study attrition	- Proportion of the study sample who complete the study - Attempts to collect data on patients who withdraw from the study - Reasons for loss to follow-up - Characteristics of patients loss to follow-up - Differences in characteristics and outcomes between patients who complete the study and patients lost to follow-up
Prognostic factor selection	- Clear definitions of candidate predictors - Selection method for final model predictors
Prognostic factor measurement	- Clearly defined method of measurement for each predictor - Handling of each prognostic factor during model development (such as continuous or discrete) - Handling of missing data and methods for imputation
Outcome measurement	- Clearly defined outcomes - Outcome ascertainment that limits misclassification - Outcome follow-up period
Statistical analysis	- Sufficient data presentation to assess the results - Primary modelling method (such as logistic regression) - Appropriate use of alternative methods (such as competing risk or multiple event models) - Appropriate confounding variables included
Reporting of model performance	- Discrimination - Calibration - Reclassification, especially when models are compared to each other or another standard of care
Clinical Usefulness	
Utility	- Risk categories provided that would trigger a diagnostic or therapeutic decision - Clinical trial data to demonstrate an effect on decision-making or clinical outcomes
Usability	- Simple risk calculator or nomogram to facilitate use at the bedside - Electronic or web-based calculator to facilitate use at the bedside

*Adapted from references 15 and 16.

Supplemental Appendix 3: Included predictive models

Study	Variable Selection Procedure	Method for Missing Variables	No. of variables considered	Variables Considered in Final Model	Variable Effect Reporting	Variable Effect (95%CI)	Variable Score
Bartholemew et al., 2004	Stepwise multivariable regression of significant variables on univariate	NR	>50	Creatinine clearance <60 mL/min Intra-aortic balloon pump use Urgent/Emergency procedure Diabetes Mellitus Congestive heart failure Hypertension Peripheral vascular disease Contrast > 260mL	Odds Ratio	5 (3.6-6.9) 5.1 (3.6-7.2) 4.4 (2.9-6.5) 3.1 (2.3-4.2) 2.2 (1.6-2.9) 2.0 (1.4-2.8) 1.9 (1.4-2.7) 1.8 (1.4-2.4)	2 2 2 1 1 1 1 1
Chen et al., 2014	Univariate analysis to identify predictors; which were then applied in stepwise multivariable logistic regression	NR	NR	Age ≥70 years History of myocardial infarction Diabetes mellitus Hypotension (sbp ≤ 90mmHg) Left ventricular ejection fraction ≤45% Anemia (Hematocrit<39% men; <36% women) Estimated glomerular filtration rate <60mL/min HDL <1 Urgent percutaneous coronary intervention	Odds Ratio	2.15 (1.58-2.94) 2.63 (2.00-3.73) 2.13 (1.51-3.00) 3.16 (1.66-6.98) 2.11 (1.58-3.58) 1.39 (1.01-1.95) 3.60 (2.79-6.92) 1.45 (1.08-1.95) 1.46 (1.02-2.07)	4 5 4 6 4 3 7 3 3
Fu et al., 2012	NR	NR	44	Estimated glomerular filtration rate <60mL/min Left ventricular ejection fraction ≤45% Diabetes mellitus Hypotension (sbp ≤ 90mmHg) Anemia (Hemoglobin <11 grams/deciliter) Age >70 years Emergency percutaneous coronary intervention Myocardial infarction Contrast dose >200 mL	Odds Ratio	3.371 (1.959-5.801 2.609 (1.559-4.366) 2.798 (1.639-5.016) 2.440 (1.138-5.234) 2.227 (1.203-3.705) 1.781 (1.004-2.914) 2.369 (1.384-4.134) 2.263 (1.387-3.878) 2.200 (1.336-4.040)	4 3 3 2 2 2 2 2 2
Gao et al., 2014	Stepwise logistic regression	NR	26	Age >60 years Hypertension Acute myocardial infarction Congestive heart failure Use of intra-aortic balloon pump Baseline estimated glomerular filtration rate 89 to 70 mL/min 69 to 50 mL/min 49 to 30 mL/min	Odds Ratio	2.23 (1.44-3.45) 2.02 (1.26-3.24) 2.14 (1.43-3.20) 2.21 (1.28-3.81) 3.90 (1.80-8.45) 1.73 (1.07-2.80) 2.14 (1.25-3.64) 3.14 (1.52-6.48)	2 2 2 2 4 1 2 3

				<30 mL/min Contrast volume: >100 to ≤300 mL >300 mL		6.66 (2.19-20.21) 1.76 (1.05-2.97) 3.63 (1.75-7.51)	6 1 3
Ghani et al., 2009	Forward selection	NR	NR	Baseline Creatinine ≥115 umol/L Shock Female gender Multivessel percutaneous coronary intervention Diabetes mellitus	Odds Ratio	13.06 (6.61-25.8) 3.83 (1.69-8.69) 2.43 (1.24-4.75) 2.37 (1.21-4.64) 2.14 (1.01-4.53)	7 3 2 2 2
Gurm et al., 2013	Forest	NR	46	Percutaneous coronary intervention indication Percutaneous coronary intervention status Coronary artery disease presentation Cardiogenic shock Congestive heart failure within 2 weeks Pre-percutaneous coronary intervention LVEF Diabetes mellitus Age Weight Height CK-MB Creatinine Hemoglobin Troponin I Troponin T		Web-based – NR	Web-based score
Liu et al., 2015	Univariate analysis to identify predictors along with other known CIN risk factors were entered into multivariate logistic regression analysis by	NR	26	Age ≥ 75 years Left ventricular ejection fraction < 40% Baseline creatinine > 1.5mg/dL	Odds Ratio	4.43 3.58 8.99	1 1 2

	forward stepwise selection						
Mehran et al., 2004	Risk factors significant in univariate analysis were included in a bootstrap sample	Excluded	NR	Model A (Cr): Hypotension (sbp <80 mmHg) Intra-aortic balloon pump use Congestive heart failure Serum creatinine>1.5mg/dl Age>75 Anemia (Hematocrit<39% men; <36% women) Diabetes mellitus Contrast volume	Odds Ratio	2.537 (1.97-3.26) 2.438 (1.68-3.54) 2.250 (1.68-3.01) 2.053 (1.59-2.66) 1.847 (1.51-2.26) 1.601 (1.33-1.93) 1.508 (1.26-1.81) 1.290 (1.21-1.38)	5 5 5 4 4 3 3 1 for 100mL
				Model B (eGFR): Congestive heart failure Hypotension (sbp <80 mmHg) Intra-aortic balloon pump use Age>75 Anemia (Hematocrit<39% men; <36% women) Diabetes mellitus Contrast volume Estimated glomerular filtration rate		2.698 (2.02-3.60) 2.676 (2.08-3.44) 2.547 (1.75-3.71) 2.195 (1.78-2.71) 1.827 (1.52-2.20) 1.597 (1.34-1.91) 1.276 (1.20-1.36) 1.194 (1.20-1.30)	5 5 5 4 3 3 1 for 100mL 2 for 40-60mL/min 4 for 20-40mL/min 6 for<20mL/min
Maioli et al., 2010	Stepwise logistic regression	Excluded	NR	One procedure within the past 72h Left ventricular ejection fraction≤45% Pre-procedure creatinine>Baseline creatinine Baseline creatinine≥1.5mg/dL Diabetes mellitus Creatinine clearance≤44ml/min Age≥73 years	Odds Ratio	4.47 (2.08-11.24) 3.46 (2.08-5.78) 3.23 (1.77-5.90) 3.10 (1.63-5.89) 2.78 (1.62-4.81) 2.65 (1.45-4.59) 2.40(1.32-4.34)	3 2 2 2 2 2 1
Marenzi et al., 2004	Logistic regression of confounders	NR	NR	Age ≥75 years Anterior myocardial infarction Time to reperfusion ≥6hours Contrast agent volume ≥300mL	Odds Ratio	5.28 (1.98-14.05) 2.17 (0.88-5.34) 2.51 (1.01-6.16) 2.80 (1.17-6.68)	1 1 1 1

				Use of intra-aortic balloon pump		15.51 4.65-51.64)	1
Tziakas et al., 2013	Logistic regression	Exclude	50	Pre-existing renal disease Metformin Hx of prior percutaneous coronary intervention Peripheral artery disease Contrast volume<300mL	Odds Ratio	7.08 (2.22-22.61) 13.7 (3.41-54.94) 4.37 (1.94-9.89) 8.58 (2.31-31.82) 2.38 (1.19-4.74)	2 2 1 2 1
Victor et al., 2014	Univariate analysis to identify predictors; multivariate logistic regression analysis by forward stepwise selection	Exclude	40	Creatinine clearance Amount of contrast Hemoglobin Diabetic microangiopathy Hypotension (sbp<80 mm Hg for at least 1 hour requiring inotropic support within 24 hours periprocedurally) Albuminuria Peripheral vascular disease	Odds ratio	7.46 (4.46-12.47) 51.65 (12.62-211.32) 1.58 (1.01-2.46) 21.94 (11.87-40.57) 13.55 (7.12-25.81) 8.10 (4.97-13.21) 10.94 (5.02-23.84)	Web-based score

Abbreviations: NR: not reported; **sbp:** systolic blood pressure; **mmHg**: millimeters mercury; **mg/dL:** milligrams per deciliter.