Online Supplementary file

eTable 1 - Study inclusion criteria.

Inclusion Criteria
• Articles in peer-reviewed journals reporting a prognostic multivariable prediction model (scoring system or algorithm) identifying patients who developed HA-AKI (or other measures of renal dysfunction in older studies) • Validation studies (and updating) of an existing model • Retrospective, prospective and case-control designs • Adults (≥18 years) in general hospital settings • Statistical measures of discrimination (AUROC or c-statistic)
Exclusion Criteria
• Patients <18 years old • Cardiac surgery, other specialised surgery (e.g. transplantation), CI-AKI • Non-human studies • Case reports or conference abstracts • Only logistic regression without a prediction model • Lack of discrimination statistics (unless model validated elsewhere) • Studies that investigated a single predictor, test, or marker • Studies that investigated only causality between one or more predictors & an outcome • Use of patients already with the outcome (e.g. AKI present at hospital admission) • Patients in primary care • Novel, not widely available tests, such as biomarkers

AUROC - area under the receiver-operating characteristic curve, CI-AKI – Contrast-Induced AKI, HA-AKI - hospital-acquired-AKI.

eTable 2 - Embase Search

LINE	SEARCH TERM
1	(acute AND kidney AND injury).ti,ab
2	AKI.ti,ab
3	(acute AND renal AND failure).ti,ab
4	ARF.ti,ab
5	(contrast AND induced AND nephropathy).ti,ab
6	ACUTE KIDNEY INJURY/
7	OR/1-6
8	predict*.ti,ab
9	PREDICTIVE VALUE OF TESTS/
10	scor*.ti,ab
11	observ*.ti,ab
12	OBSERVER VARIATION/
13	8 OR 9 OR 10 OR 11 OR 12
14	7 AND 13
15	(acute AND kidney AND injury).ti,ab
16	AKI.ti,ab
17	(acute AND renal AND failure).ti,ab
18	ARF.ti,ab
19	(contrast AND induced AND nephropathy).ti,ab
20	ACUTE KIDNEY FAILURE/
21	OR/15-20
22	predict*.ti,ab
23	exp METHODOLOGY/
24	validat*.ti,ab
25	OR/22-24
26	21 AND 25
27	14 AND 26
	Articles: 9102

eTable 3 Ovid MEDLINE® search

Line	Search term
1	(acute AND kidney AND injury).ti,ab
2	AKI.ti,ab
3	(acute AND renal AND failure).ti,ab
4	ARF.ti,ab
5	(contrast AND induced AND nephropathy).ti,ab
6	ACUTE KIDNEY INJURY/
7	OR/1-6
8	predict*.ti,ab
9	PREDICTIVE VALUE OF TESTS/
10	scor*.ti,ab
11	observ*.ti,ab
12	OBSERVER VARIATION/
13	OR/8-12
14	7 AND 13
	Articles: 9646

eTable 4 - Web of Science search

RESULTS	WEB OF SCIENCE SEARCH
8002	(TS=((acute kidney injury) OR (aki) OR (acute renal failure) OR (arf) OR (contrast induced nephropathy)) AND TS=(predict* OR scor* OR observ* OR validat*)) AND DOCUMENT TYPES: (Article) Refined by: WEB OF SCIENCE CATEGORIES: (UROLOGY NEPHROLOGY OR SURGERY OR CARDIAC CARDIOVASCULAR SYSTEMS OR TRANSPLANTATION OR CRITICAL CARE MEDICINE OR MEDICINE GENERAL INTERNAL OR MEDICAL INFORMATICS OR GASTROENTEROLOGY HEPATOLOGY OR ANESTHESIOLOGY) AND DOCUMENT TYPES: (ARTICLE) AND WEB OF SCIENCE CATEGORIES: (UROLOGY NEPHROLOGY OR SURGERY OR CARDIAC CARDIOVASCULAR SYSTEMS OR TRANSPLANTATION OR MEDICAL INFORMATICS OR CRITICAL CARE MEDICINE OR HEALTH CARE SCIENCES SERVICES OR MEDICINE GENERAL INTERNAL OR MEDICAL LABORATORY TECHNOLOGY OR GASTROENTEROLOGY HEPATOLOGY OR ANESTHESIOLOGY OR EMERGENCY MEDICINE) Indexes=SCI-EXPANDED Timespan=All years

eTable 5 - CHARMS checklist and data extracted for systematic review.

Item	Explanation in the Review
1. Type of studies	Prognostic prediction models
2. Scope	Published prognostic prediction models for development of AKI in general hospital settings; to inform risk stratification & potential uses in decision-making in different patient groups
3. Type of studies	Model development +/- external validation in independent data; external model validation & model updating, if present
4. Target population	Adult (≥18) Patients in acute hospital environment
5. Outcome predicted	Development of AKI (or equivalent definition, including RRT) after an admission to hospital or Surgery
6. Time span of prediction	In-hospital development of the outcome
7. Intended moment of using the model	Pre-operatively to predict the risk of post-op AKI or need for RRT; at admission to risk stratify or guide therapy
Summary of Data extracted	
• Data source (years, retrospective, prospective; cohort, case-control, trial data) • Participants & setting (eg cardiac surgery, single or multi-centre, country • Primary outcome (and any blinding) • Candidate predictors (definitions; continuous data dichotomised? & how selected for modelling) • Sample size, EPV (including all predictors considered) • Type of model(s) evaluated - derivation, validation (internal, external) • Missing data, number included & excluded (criteria) • Type of model (eg full model approach), shrinkage • Incidence of outcome & mortality data • Predictors in the model(s) • Performance: discrimination (AUC or C-Statistic) & calibration (eg H-L P value, slope/curve), risk groups • Internal & external validation (in same study) • External validation studies with relevant performance measures • Additional resources, funding	

AKI – acute kidney injury, EPV – events per variable, H-L – Hosmer-Lemeshow goodness-of-fit test, RRT – renal replacement therapy.

eTable 6(i) Surgery

Author, Type, TRIPOD detail	Population, Outcome, AKI Definitions, Methods	Outcomes, Predictors & Model Performance	External Validation
Kheterpal 2007 **General surgery** **TRIPOD 1A - Derivation** **(25/37 pts)**	USA single centre, retrospective cohort study (n=65,043). Data collected 2003-6. Mean Age with outcome 59, without outcome 47 (P<0.001). Male with outcome 56%, without outcome 52% (P=0.32). Inclusion: pre-op eGFR (Cockcroft-Gault) ≥80 ml/min; major surgery (≥2 days in-patient). Exclusions (n=49,941): pre-op eGFR <80 (n=5659). cardiac, transplant, urology & ECT, suprarenal aortic cross-clamping; pre-op AKI & IV contrast <7 days post-op, no pre-op SCr (n=6,534). Included: n=15,102. Outcome: reduction of eGFR to ≤50ml/min <7 days post-op. Predictors: 24 pre, 6 intra-op. Collinearity predictors evaluated; bivariate correlation matrix; remaining predictors entered into logistic regression full model fit. Missing data: excluded from full model. After exclusions n=14,066 included. Un-weighted model continuous predictors dichotomised.	Outcome (AKI) in 0.8% (n=121), 0.1% (n=14) required RRT. Propensity matched 30-day mortality with outcome 15% (n=17/118) vs. 2.7% (n=9/352) without. AKI associated with significant increase in 30-day, 60-day, 1-yr mortality. **7 pre-op predictors: age, emergent surgery, liver disease, BMI, high-risk surgery, PVD & COPD.** Weighted c-Statistic 0.77 (95% CIs 0.75-0.79). Un-weighted risk factor scale (cut-off Age >59, BMI ≥32) c-Statistic 0.73 (0.7-0.76). With intra-op: vasopressor dose, infusion & diuretic: AUC 0.79 (0.77-0.81) No calibration statistics.	Xing 2012 - AUC 0.66
Kheterpal 2009 **General surgery** **TRIPOD 2A - Derivation, Validation** **(28/37 pts)**	USA multi-centre (121) retrospective database study (n=152,244). 2005-6. Mean age with outcome 64.8 (±14.8), without 53.5 (±17.3) (P<0.001). Male with outcome 57%, without outcome 39% (P<0.001). Included n=75,952. Random split derivation 75% (n=57,080) & validation (25% n= 18,872). Exclusions (n=76,292): vascular, cardiac, urology, ophthalmology, obstetric, or urologic procedures; day case; pre-op AKI (rapidly increasing azotaemia & SCr ≥265 µmol/L <24h of surgery) or previous RRT (n=1637). Admission SCr taken as baseline, assessed as predictor & included in the model. 'Mild' pre-op renal insufficiency defined SCr 106-168 µmol/L; 'moderate' >177 µmol/L. Outcome: AKI defined as increase SCr ≥177 µmol/L (from pre-op value) or RRT <30 days. Missing data: SPSS assessed impact of imputation. Continuous predictors dichotomised. Collinearity & Pearson correlations evaluated for all 19 preoperative predictors (comorbidities, drugs, type of surgery). Remaining predictors entered into full model fit logistic regression.	Outcome in 1% (n=762/75,952) – n=561 derivation, n=201 in validation sets. Mortality 42% (n=320) in those with outcome vs 8% in a propensity matched group without outcome. **9 predictors (simplified risk index): age ≥56 yr, male, emergency, intraperitoneal surgery, diabetes, CCF, ascites, HTN, mild or moderate pre-op renal insufficiency.** c-Statistic 0.80 (0.79-0.81) in derivation & internal validation cohorts. Calibration: Risk classes reported for derivation vs validation sets.	-

eTable 6(ii) Trauma & Orthopaedics			
Author, Type, TRIPOD detail	**Population, Outcome, AKI Definitions, Methods**	**Outcomes, Predictors & Model Performance**	**External Validation**
Bell 2015 **T&O** **TRIPOD 3,4 – Derivation, Internal & EV** **(34/37 pts)**	UK multi-centre (3) retrospective cohort study linking multiple prospectively collected databases (n=15,218). 2005-11. Overall mean age 70.7 (±15.3), with outcome 76.5 (±11.1) without outcome 70.0 (±15.6). Overall Male 37%, with outcome 47%, without 36%. Included: derivation n=6,220 (2 sites) & validation n=4,395 (1 site). Exclusions: missing SCr (n=2,688), RRT, 2nd operation (n=1,915). Outcome: KDIOGO SCr changes <7 days. CKD defined using eGFR from CKD-EPI. Admission SCr taken as baseline if elective admission. Entered 11 candidate predictors (age, sex, CKD (baseline eGFR), diabetes, number drugs, ACEi/ARB, NSAID/COX-2, statin, urgency, ASA grade & deprivation category into Backward/forward multivariable selection. Applied a conservative selection criterion of P<0.15 to limit over-fitting risk. Bootstrapping for IV. To assess robustness sensitivity analyses performed: multiple imputation relaxing & restricting the backward selection removal criterion & adding non-linear & interaction terms. Categorised eGFR.	Outcome (AKI) in 10.8% (n=672) derivation & 6.7% (n=295) validation sets. With AKI adjusted hazard ratio 1.53 (95% CI 1.38-1.70). **7 predictors: age, male, diabetes, number drugs, CKD (eGFR), ACEi/ARBs & ASA.** Risk calculator supplied. Derivation AUC 0.74 (0.72-0.76), Internal validation 0.73. EV 0.70. Risk groups shown. Calibration plot. Calibration suboptimal in validation cohort (over-predicted risk). Re-calibration: correction factor, added to intercept; intercept and regression coefficient index as the only predictor used to transform prognostic index & compute recalibrated probabilities.	Same Study different site AUC 0.70

eTable 6(iii)
General admissions

Author, Type, TRIPOD detail	Population, Outcome, AKI Definitions, Methods	Outcomes, Predictors & Model Performance	External Validation
Drawz 2008 **Medicine, surgery, obstetrics** **TRIPOD 2A – Derivation, Internal Validation (26/37 pts)**	USA multi-centre (3), retrospective, case-controlled study (n=180 cases, n=360 controls). 2003. Mean age with outcome 67, controls 63 (P=0.01). Males with outcome 74%, controls 80% (P=0.18). Hospital-acquired AKI (HA-AKI) defined: increase SCr ≥44µmol/L if baseline SCr ≤168µmol/L), ≥88µmol/L baseline 177-433µmol/L & ≥133µmol/L baseline >442µmol/L. Admission SCr presumed to be baseline. Random split derivation (2/3) & internal validation). 'Control' cases – mix of same discharge diagnosis or next patient admitted to clinical team. Inclusions: age ≥18 & normal admission SCr or admission SCr not qualifying as AKI vs known baseline. Exclusions: RRT, no repeat SCr performed. 19 predictors assessed: demographics (age, sex, race), medical history, medications & admission observations & blood parameters (BP, HR, HCO3, urea, SCr, & albumin). Predictors with p value <0.20 univariate analysis entered into multiple logistic regression model. Final model chosen by maximizing likelihood ratio, c-statistic & R2 while minimizing AIC. Also produced a simplified model, created by categorizing continuous variables into quartiles. Cases with missing data excluded. Multiple imputation also performed.	No information on mortality. **7 predictors: age, SBP, HR, HCO_3, urea, albumin & drugs (NSAIDs, ACE-I, ARBs or diuretic).** Derivation c-statistic 0.73. Simplified: HR ≥70/min, HCO_3 (<24 or >30mmol/L), SCr ≥88µmol/L & drugs. Internal validation 0.66. Simplified model HR ≥70, HCO_3 (<24 or >30mmol/L), SCr ≥88 µmol/L & NSAIDs/ACEi/ARBs/Diuretics - C-statistic derivation 0.69, internal validation 0.66. No H-L p-value. Risk range in validation set plotted: 0/1 risk factor = 16% risk HA-AKI, vs 4 risk factors = 62%.	-
Matheny 2010 **General admissions** **TRIPOD 1B – Derivation** **(28/37 pts)**	USA single centre, retrospective cohort study (n=61,179). 1999-2003. No data on mean age (25.6% age >65). Overall males 44.4%. Inclusions: adult admissions ≥2 days (n=26,107). Exclusions: missing data, those with a baseline eGFR <60 (n=11,342), AKI on admission, no SCr available within 48 hrs of admission (n=10,378) or no repeat SCr (n=13,352). Outcome (<30 days post admission): AKI Risk = ≥2 SCr results ≥150% of baseline. AKI Injury = ≥200% baseline. eGFR using MDRD equation. 27 predictors assessed: coded diagnoses (including admission diagnosis), blood parameters (including admission SCr) & drugs following univariate analysis placed in multivariable model. Missing values captured as a separate category. 10-fold cross-validation employed to estimate overfitting.	AKI Risk 5.2% (n=1,352), AKI Injury 2.8% (n=726). No mortality data. **27 predictors: Female, Age, Race, 11 classes of drugs, Contrast, bacterial infection (use of antibiotics), admission SCr, MI, rhabdomyolysis, hepatitis, pancreatitis, ammonia, AST/ALT ratio, thrombocytopenia, leucocytosis, hypercalcaemia, glucose.** AKI Risk: AUC 0.75 (0.73–0.76). H-L P = 0.29. AKI Injury: AUC 0.78 (0.76–0.79), H-L P=0.12. Calibration plotted by deciles.	-

eTable 6(iii) General admissions			
Author, Type, TRIPOD detail	**Population, Outcome, AKI Definitions, Methods**	**Outcomes, Predictors & Model Performance**	**External Validation**
Forni 2013 **General medical TRIPOD 2B, 4 – Derivation, Internal & EV** **(29/37 pts)**	UK single centre. Prospective cohort study (n=3,707). 2012. Median (IQR) age with outcome 80 (70-86), without outcome 73 (61-81) (P<0.001). Males with outcome 51% without outcome 49% (P=0.834). Inclusion: medical patients staying >1 night in hospital (n=1,867). Exclusions: RRT, non-medical patients, age <18, AKI on admission (n=184), missing data (n=553). Included n=3,523. Derivation n=1,867. Outcome: AKI (KDIGO SCr change <7 days). CKD defined – eGFR <60 on Pre-admission SCr measured >1 month & <6 months. Internal validation: patients with no previous SCr result, but with a SCr on admission within normal range (defined 80-120µmol/L) (n=1,656). 25 predictors on univariate, If P <0.05 variable entered into multivariable analysis. No missing data information.	Derivation group developed AKI 7% (n=95) – mortality 20% vs 3.5% (n=62) without outcome. In validation cohort n=60 developed AKI. **7 predictors: Age 60-79 (1 point) ≥80 (3 pts), CCF, CKD, Diabetes (2 pts), Liver disease (3 pts), respiratory rate ≥20/min, <alert on AVPU score (3 pts).** Derivation AUC 0.72 (0.66–0.77). H-L P=0.96. Risks plotted. Validation AUC 0.76 (0.71–0.82). No H-L reported.	Hodgson 2017, AUC 0.65-0.71
Bedford 2016 **General admissions TRIPOD 2A, 3 – Derivation, EV** **(29/37 pts)**	UK multi-centre (3), 2011. Retrospective cohort study (n=11,655). Average age and sex not given. Included: derivation n=7,556 admissions & internal validation n=2,514. Exclusions: non-emergency, pre-admission AKI, AKI at admission, obstetrics, patients with no info on AKI at 72 hours. Outcomes: AKI & AKI Stage 2/3. AKI <72 hours, using KDIGO change in SCr. Ordinal logistic regression with univariable analysis for development of multivariable analysis. 45 Predictors included demographics, bloods, prior admissions, co-morbidity. Backwards selection used for retention of statistically significant predictors. Missing data excluded or given own category. 3:1 random split for internal validation. External validation n=1,585, single centre.	Derivation AKI 9.6% (n=241), AKI 2/3: n=40. No mortality data. EV AKI 7.6% (n=120), AKI 2/3 n=12. **12 predictors: age, primary diagnosis, previous hospital admissions, Charlson co-morbidity index score, HbA1C, troponin, proteinuria, baseline eGFR, K^+, WCC, Mg^{2+}, CRP.** IV AUC 0.67 (0.64-0.71) any AKI, 0.68 for AKI 2/3. No derivation AUC H-L P=0.04 any AKI model, P=0.005 for AKI 2/3.	Same study AUC 0.71 (0.63 AKI 2/3). H-L P=0.12 AKI, P=0.14 for AKI 2/3.
Koyner 2016 General admissions TRIPOD 2A Derivation, Internal Validation (24/37 pts)	USA multi-centre (5) Retrospective cohort study (n=269,999). 2008-2013. Mean age with outcome 70 (±16), without outcome 63 (±19) (P<0.001). Males with outcome 49%, without outcome 43% (P<0.001). Included: n=202,961. Exclusions: SCr >354 µmol/L on admission (n=11,305), those without SCr measurement (n=52,508) & AKI prior to arrival on ward (n=3,225). Admission SCr defined as baseline, assessed as predictor & included in model. Outcome: rise SCr as per KDIGO but within 24hrs period. Model included 29 predictors. Continuous predictors modelled using restricted cubic splines with knot placement. Variable importance plot created. Laboratory values & vital signs updated periodically therefore separated into time intervals & logistic regression used for model estimation. Values closest to beginning of that time variable used to predict outcome for that interval, if no values available during an interval, most recent value used, if no previous value available, median value across entire cohort imputed. Split derivation (60%) & internal validation (40%) by time.	AKI 8.6% (n=17,541). Mortality with outcome 6% (n=1031) vs 1% (n=1,419) without **29 predictors: SCr, Urea, HR, anion gap, Urea/SCr, RR, glucose, WCC, K^+, Oxygen Saturations, age, HCO_3, Na^+, temperature, prior ICU, albumin, bilirubin, Ca^{2+}, platelets, time, SBP/ DBP, pulse pressure, sex, AVPU, Alkaline phosphatase, Hb, total protein, AST.** Dsicrimination reported for validation cohort only: AKI AUC 0.74 (0.74-0.74), AKI Stage 3 AUC 0.83 (0.83-0.84) Model including only SCr, BUN & their ratio AUC 0.69 (0.68-0.69).	-

eTable 6(iv)
Heart failure

Author, Type, TRIPOD detail	Population, Outcome, AKI Definitions, Methods	Outcomes, Predictors & Model Performance	External Validation
Forman 2004 **TRIPOD 1B - Derivation, Internal Validation** **(26/37 pts)**	USA multi-centre (11) retrospective cohort study (n=1,009). 1997-8. Overall mean age 67 (±15), with outcome 68.7, without outcome 66.8 (P=0.07). Overall males 51.2%, 52% with outcome 50.9% without outcome. Exclusion (number not given): elective, <2 days, severe aortic stenosis, anticipated transplant, RRT, LVAD, high output failure, age <20, chemotherapy. Excluded n=5 with missing charts. Included n=1004. Outcome: worsening renal function (WRF) - rise SCr >26.5µmol/l during admission. 29 predictors assessed: demographics, history, drugs, symptoms, signs. Unclear method for excluding patients who had AKI at admission. Used admission SCr as baseline & as a predictor. Multivariable Cox regression models, stepwise selection. Bootstrapping for IV. Missing data: predictors missing >15% excluded; categorical data assumed "not present" & separate dummy indicator used if >5% of values missing.	'WRF' 27% (271/1,004). Mortality: risk ratio 7.5 with outcome (number not reported). **4 predictors: CCF, diabetes & BP >160 mmHg (1 point), SCr 132.6-212µmol/l (2 points) & SCr >221µmol/l (3 points).** Risk 'WRF': 0 pts = 10%, 1 = 19%, 2 = 20%, 3 = 30%, 4+ = 53%. 22% of total sample with risk score ≥4 had 53% likelihood WRF vs 10% risk among 12% with risk score 0 points (p<0.001). **No AUC or Calibration statistics.**	Breidthardt 2011 - 0.65 Wang 2013 - 0.65
Breidthardt 2011 **TRIPOD 1A – Derivation, (EV Forman)** **(23/37 pts)**	Swiss multi-centre (3) prospective analysis, with derivation (Basel score) & external validation of Forman score (n=767). 2001-2, 2006-2010. Overall median age 79 (71-85), with outcome 79 (72-85), without outcome 79 (70-85) (P=0.36). Overall males 55%, with outcome 61%, without outcome 54% (P=0.08). Included n=657. Exclusions (n=110): stay <2 days, incomplete SCr. Outcome: WRF = in-hospital increase SCr ≥26.5µmol/L. CKD from eGFR (using MDRD equation) <60 for >3/12 pre-admission. eGFR at admission to hospital included as a predictor. Unclear method for excluding patients who had AKI at admission. 48 predictors assessed on univariate & those with P value <0.05 entered into multivariable analysis. No missing data information. n=223 had blood gas analysis.	Outcome 21% (136/657). In-hospital mortality with outcome 17% (n=23) vs 6% (n=33) without (P <0.01). **3 predictors (n=223): HCO_3 <21 mmol/L, Diuretics, CKD** - AUC 0.71 (0.63-0.79). A computer-based, complex, exponential risk model AUC 0.75 (0.67-0.82). No H-L calibration data. Scores & percentage developing outcome: 0 - 1%, 1 –35%, 2 –27%, 3 – 35%.	-

eTable 6(iv)
Heart failure

Author, Type, TRIPOD detail	Population, Outcome, AKI Definitions, Methods	Outcomes, Predictors & Model Performance	External Validation
Wang 2013	China, single centre, retrospective cohort study (n=1,709). 2004-11. Median age with outcome 73 (67-78), without outcome 71 (63-75) (P<0.001). Males 56.6% with outcome, 55% without outcome (P=0.13).	Overall AKI 32% (n=550). Mortality 16.5% (n=91) vs.1.9% (n=22) without AKI (P <0.01). Stay with AKI 14 vs. 11 days without (P <0.01).	
TRIPOD 2A – Derivation, External validation (Forman) **(30/37 pts)**	Inclusion: CCF admission diagnosed by 2 cardiologists using European Society of Cardiology guidelines. Exclusions: age <18, stay <2 days, missing data, hospital transfer, use LVAD, ESRD or RRT & septic or haemorrhagic shock; cardiac op, pacemaker or cardioversion & contrast. Split derivation (60%, n=1010) & validation (40%, n=699). Outcome: AKI (AKIN): increase SCr ≥26.4 µmol/L or ≥50% in <48 hrs. eGFR – MDRD – unclear whether admission SCr was used to estimate baseline eGFR or how patients with AKI at admission were excluded. Admission SCr used as a predictor. 35 predictors – those with P value <0.1 on unviariate analysis placed in multivariate analysis (n=932).	**8 predictors: Age ≥70; ≥3 CCF admissions, systolic BP <90mmHg, Na^+ <130mmol/L, NYHA IV, proteinuria, SCr ≥104 µmol/L & furosemide dose ≥80 mg/day.** Derivation AUC 0.76 (0.73–0.79) H-L P=0.98. Calibration plots by deciles. Validation 0.76 (0.72-0.8), H-L P=0.13. ≥8 points high risk - 55.1% incidence vs. 18% if <8 points No calibration slope. Forman - 0.65 (0.62–0.69). vs Forman score, improvement of 0.11 AUC, (P <0.001(DeLong)(9)	-

eTable 7 – Abbreviations used in eTable 6(i-iv)

ACEi – Angiotensin-converting enzyme inhibitors
AKI – Acute kidney injury
AKIN – Acute kidney injury network
ALT – Alanine aminotransferase
ARB – Angiotensin receptor blockers
ASA – American Society of Anesthesiologists Physical status grading used in pre-operative assessment
AST – Aspartate transaminase
AVPU – scale of consciousness best response: **A**lert, responds to **V**oice, **P**ain, **U**nresponsive.
AUC/AUROC – Area under the receiver operating characteristic curve
BMI – Body mass index
BP – Blood pressure
CA-AKI – Community-acquired AKI
Ca^{2+} - Serum Calcium
CI-AKI – Iodinated contrast AKI
CKD – Chronic kidney disease
COPD - Chronic obstructive pulmonary disease
CCF – Congestive cardiac failure
CKD-EPI – CKD Epidemiology collaborative equation
COX – Cyclo-oxygenase
CRP – C-reactive protein
D – Derivation study
DBP – Diastolic Blood Pressure
eGFR – estimated glomerular filtration rate
ESRD – end-stage renal disease
EV – External validation study
HA-AKI – Hospital-acquired AKI
Hb - Haemoglobin
HbA1C – glycated haemoglobin (A1c) Marker of long-term glucose control
HCO_3 – serum Sodium Bicarbonate
H-L – Hosmer-Lemeshow goodness-of-fit test (Calibration statistic)
HR – Heart rate (beats per minute)
HTN – Hypertension
ICU – Intensive Care Unit
IHD – Ischaemic heart disease
IV – Internal Validation study
K^+ - Serum Potassium
KDIGO – Kidney disease improving global outcomes (Stage 1-3 AKI defined by magnitude of SCr rise or fall in ur
LOS – length of stay
LVAD – Left ventricular assist device
LVEF – Left ventricular ejection fraction
MAP – Mean arterial pressure
MDRD – Modification of diet in renal disease equation
Mg^{2+} - serum Magnesium
MI – Myocardial infarction
Na^+ – Serum sodium
NSAID – Non-steroidal anti-inflammatory agent

NYHA – New York Heart Association Classification for heart failure (I-IV)
PVD – Peripheral vascular disease
RIFLE – Risk, Injury, failure, loss of kidney function
RR – respiratory rate (breaths per minute)
RRT – Renal replacement therapy
SCr – serum creatinine
Systolic Blood Pressure
TRIPOD – Transparent Reporting of a multivariable prediction model for Individual Prognosis or Diagnosis. Checklist in derivation (37 points – 1 point for each recommended item reported). **TRIPOD Study types** Type 1a: Development only Type 1b: Development and validation using resampling Type 2a: Random split-sample development and validation, Type 2b: Non-random split-sample development and validation Type 3: Development and validation using separate data Type 4: Validation only. WCC – White cell count WRF – 'worsening renal failure' (defined by individual study)

eTable 8 - TRIPOD items reported in the 11 studies.

Title & Abstract		TRIPOD Item description	Reported ?
Title	1	Identify study as developing &/or validating a multivariable prediction model, target population & outcome.	10
Abstract	2	Provide a summary of objectives, study design, setting, participants, sample size, predictors, outcome, statistical analysis, results & conclusions.	9
Introduction			
Background & objectives	3a	Explain medical context (including whether diagnostic or prognostic) & rationale for developing or validating the multivariable prediction model, including references to existing models.	11
	3b	Specify objectives, including whether the study describes development or validation of the model or both.	11
Methods			
Source of data	4a	Describe study design or source of data (e.g., randomized trial, cohort, or registry data), separately for the development & validation data sets, if applicable.	11
	4b	Specify key study dates, including start of accrual; end of accrual; & if applicable, end of follow-up.	11
Participants	5a	Specify key elements of the study setting (e.g., primary care, secondary care, general population) including number & location of centres.	11
	5b	Describe eligibility criteria for participants.	11
	5c	Give details of treatments received, if relevant.	9
Outcome	6a	Clearly define outcome predicted by the prediction model, including how & when assessed.	11
	6b	Report any actions to blind assessment of the outcome to be predicted.	0
Predictors	7a	Clearly define all predictors used in developing or validating the model, including how & when they were measured.	11
	7b	Report any actions to blind assessment of predictors for the outcome and other predictors.	0
Sample size	8	Explain how the study size was arrived at.	2
Missing data	9	Describe how missing data were handled (e.g., complete-case analysis, single imputation, multiple imputation) with details of any imputation method.	7
Statistical analysis methods	10a	Describe how predictors were handled in the analyses.	11
	10b	Specify type of model, model-building procedures (including predictor selection) & method for internal validation.	11
	10c	For validation, describe how the predictions were calculated.	6
	10d	Specify all measures used to assess model performance & if relevant, to compare multiple models.	8
	10e	Describe any model updating (e.g., recalibration) arising from the validation, if done.	1
Risk groups	11	Provide details on how risk groups were created, if done.	10
Development vs. validation	12	For validation, identify differences from development data in setting, eligibility criteria, outcome & predictors.	4
Results			
Participants	13a	Describe flow of participants through the study, including number of participants with & without the outcome & if applicable, a summary of the follow-up time. A diagram may be helpful.	11
	13b	Describe characteristics of the participants (basic demographics, clinical features, available predictors), including the number of participants with missing data for predictors & outcome.	9
	13c	For validation, show a comparison with the development data of the distribution of important variables (demographics, predictors and outcome).	3
Model development	14a	Specify the number of participants & outcome events in each analysis.	11
	14b	If done, report the unadjusted association between each candidate predictor & outcome.	11
Model specification	15a	Present the full prediction model to allow predictions for individuals (i.e., all regression coefficients & model intercept or baseline survival at a given time point).	8
	15b	Explain how to the use the prediction model.	11
Model performance	16	Report performance measures (with CIs) for the prediction model.	8
Model-updating	17	If done, report the results from any model updating (i.e., model specification, model performance).	1
Discussion			
Limitations	18	Discuss any limitations of the study (non-representative sample, few events per predictor, missing data).	11
Interpretation	19a	For validation, discuss results with reference to performance in development data & any other validation data.	8
	19b	Give overall interpretation of results, considering objectives, limitations, results from similar studies & other relevant evidence.	11
Implications	20	Discuss potential clinical use of the model & implications for future research.	11
Other information			
Suppl info	21	Provide information about availability of supplementary resources, (study protocol, Web calculator, & data sets).	3
Funding	22	Give the source of funding & role of the funders for the present study.	9

Red colouring highlights items reported in less than 50% of the 11 AKI prediction model studies.

eTable 9 – Most common predictors included in the 11 models

Field	Total	General Surgery		T&O	General					Heart Failure		
Study		Kheterpal 2007	Kheterpal 2009	Bell 2015	Drawz 2008	Matheny 2010	Koyner 2016	Bedford 2016	Forni 2013	Forman 2004	Breidthardt 2011	Wang 2013
Demographics												
Age	**9**	**X**	**x**	**x**	**x**	**x**	**x**	**x**	**x**			**x**
Male/gender	**3**		**x**	**x**			**x**					
Past history												
Diabetes	**5**		**x**	**x**				**x**	**x**	**x**		
CKD	**4**			**x**				**x**	**x**		**x**	
Heart failure	**4**		**x**						**x**	**x**		**x**
Liver disease	**3**	**X**				**x**			**x**			
Drugs												
Diuretics	**4**				**x**	**x**					**x**	**x**
ACEi/ARBs	**3**			**x**	**x**	**x**						
Observations												
Hypotension/ Shock	**3**				**x**		**x**					**x**
Bloods												
SCr	**5**		**x**			**x**	**x**			**x**		**x**
Bicarbonate	**4**				**x**	**x**	**x**				**x**	
↑WCC	**3**					**x**	**x**	**x**				

ACEi – angiotensin-converting enzyme inhibitor drugs, ARB – Angiotensin 2 receptor blocker drugs, CKD = chronic kidney disease, Bloods – laboratory parameters, SCr – serum creatinine, T&O – Trauma and Orthopaedics, WCC – white cell count.

eTable 10 – All predictors included in the 11 models

Field	General Surgery		T&O	General					Heart Failure			Total
Study	**Kheterpal 2007**	**Kheterpal 2009**	**Bell 2015**	**Drawz 2008**	**Matheny 2010**	**Koyner 2016**	**Bedford 2016**	**Forni 2013**	**Forman 2004**	**Breidthardt 2011**	**Wang 2013**	
Demographics												
Age	x	x	x	x	x	x	x	x			x	9
Male/gender		x	x			x						3
BMI	x											1
Race					x							1
Past history												
Diabetes		x	x				x	x	x			5
CKD			x				x	x		x		4
Heart failure		x						x	x		x	4
Liver disease	x				x			x				3
Hypertension		x										1
PVD	x											1
Ascites		x										1
COPD	x											1
Previous admissions						x (ICU)	x					2
Charlson co-morbidity index							x					1
ASA Grade			x									1

Field	General Surgery		T&O	General					Heart Failure			Total
Study	**Kheterpal 2007**	**Kheterpal 2009**	**Bell 2015**	**Drawz 2008**	**Matheny 2010**	**Koyner 2016**	**Bedford 2016**	**Forni 2013**	**Forman 2004**	**Breidthardt 2011**	**Wang 2013**	
Drugs												
Diuretics				x	x					x	x	**4**
ACEi/ARBs			x	x	x							**3**
NSAIDs				x	x							**2**
Contrast					x							**1**
Number of drugs			x									**1**
Other drugs[1]					x							**1**
Observations												
Hypotension / Shock				x		x					x	**3**
Pulse pressure						x						**1**
Hypertension				x					x			**2**
Heart rate[2]				x		x						**2**
Temperature						x						**1**
Respiratory rate[3]						x		x				**2**
O2 saturations						x						**1**
Consciousness[4]						x		x				**2**
Surgery, Other												
Type of surgery	x	x										**2**
Emergency	x	x										**2**
Time						x						**1**

Field	General Surgery		T&O	General					Heart Failure			Total
Study	Kheterpal 2007	Kheterpal 2009	Bell 2015	Drawz 2008	Matheny 2010	Koyner 2016	Bedford 2016	Forni 2013	Forman 2004	Breidthardt 2011	Wang 2013	
Labs, Diagnosis												
Primary diagnosis							x					**1**
SCr		x			x	x			x		x	**5**
Haemoglobin						x						**1**
↓Platelets[5]					x	x						**2**
CRP							x					**1**
↑WCC					x	x	x					**3**
Bacterial infection[6]					x							**1**
MI[7]					x		x					**2**
Rhabdomyolysis[8]					x							**2**
Hepatitis/AST[9]					x	x						**2**
Alk Phosphatase						x						**1**
Bilirubin						x						**1**
Pancreatitis[10]					x							**1**
Bicarbonate				x	x	x				x		**4**
Anion gap						x						**1**
BUN/Cr						x						**1**
Urea				x		x						**2**
↑Ca^{2+}/Ca^{2+}[11]					x	x						**2**
↑glucose					x	x						**2**
Magnesium							x					**1**
Potassium						x	x					**2**
↓Na^{+}/Na^{+}[12]						x					x	**2**
Albumin				x		x						**2**
Total protein						x						**1**
Proteinuria							x				x	**2**

eTable 11 – Handling of Serum Creatinine and Chronic Kidney Disease in the models

Author, year (n=derivation cases)	**Kheterpal 2007 (n=14,066)**	**Kheterpal 2009 (n=57,080)**	**Bell 2015 (n=6,220)**	**Drawz 2008 (n=360)**	**Matheny 2010 (n=26,107)**	**Koyner 2016 (n=202,961)**	**Bedford 2016 (n=7,556)**	**Forni 2013 (n=1,867)**	**Forman 2004 (n=1,004)**	**Breidthardt 2011 (n=657)**	**Wang 2013 (n=1,010)**
CKD defined			X				X	X	X	X	X
Admission SCr used as baseline		X		X		X			X		X
Omitted cases with reduced GFR	X				X						
Admission SCr assessed as predictor		X		X	X	X			X	X	X
CKD included in model			X				X	X		X	
Admission SCr included in model		X			X	X			X		X

CKD - Chronic Kidney Disease, SCr - Serum Creatinine. Red shading indicates concern over handling of SCr in the study.