Can Big Data Drive Better Care for AKI? Leveraging Big Data in AKI and CRRT

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AKI & CRRT 2018, San Diego, California

Thursday, March 8, 2018 – T4 12:30 – 2:00 pm

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2018 Disclosures

- **Speaking/consulting:** Baxter Healthcare Corp.
- **Steering Committee:** Spectral Medical Inc.

Objectives

- Describe the elements necessary for the development and implementation of an e-alert for AKI
- Describe the importance of education, audit and feedback and integrated clinical decision support during the implementation of an e-alerts for AKI
- Appreciate the limitations and barriers to implementation of e-alerts for AKI

Not a new idea……NEJM 1968

SPECIAL ARTICLE

MEDICAL RECORDS THAT GUIDE AND TEACH

LAWRENCE L. WEED, M.D.*

THE beginning clinical clerk, the house officer and the practicing physician are all confronted with conditions that are frustrating in every phase of medical action. The purpose of this article is to

9/10

Pt. received 40 units of regular insulin yest. because of B & 4+ urine sugars. Got 2000 cc Amigen yest. & 500 cc D_5W. Was febrile all night up to 40 at 8 PM this gradually came down to 39. 8 PM yest. suctioned & coughed up c̄ return of ½ cup of thick white sputum — cultured also blood cultures. Was in must. tent c̄ mucomist overnight. At 4 PM yest had B-R base. Sputum smear unremarkable — WBC's but no bacteria.

9/10-12:30

10 o'clock urine 2-3+/0. Given 10 U. reg. ins. at 12:30 PM. Temp. down to 38? Suctioned N.T. ō little return. However during suctioning pt. vomited 100-150 cc green fluid. Proximal jejunostomy tube draining well now.

9/11-9 AM

Urine 3+ given 10 U reg. insulin. Pt. was hiccuping all night & this AM. Levine tube passed c̄ 900-1000 cc bileous fluid removed. Jejunos-

acceptance and use of paramedical personnel and a more positive attitude about the computer in medicine. Eventually, for every physician all three areas will be an obligatory part of his professional envi-

Imp: prob. resolving now
Plan: KUB and continue small feedings

d. *Sepsis:* afebrile now on Ampicillin. see flow sheet. Reculture tomorrow.
b. *RLL Pneumonia:* Film of 9/28 shows some ↑ in this process. Will repeat P.A. chest tomorrow & cultures.
e. *Colonic-Cutaneous Fistula:* Continues to drain semi-formed stool several times per day; the problem is that stool drains onto granulating abd. wound.
Plan: culture stool; Remove some non-func stay sutures; Freq dressings & consider colostomy bag for fistula

10/3

#1 Chronic Relapsing Panc.:
c. *Panc. insufficiency:* Cotazyn-B will be begun (special purchase)

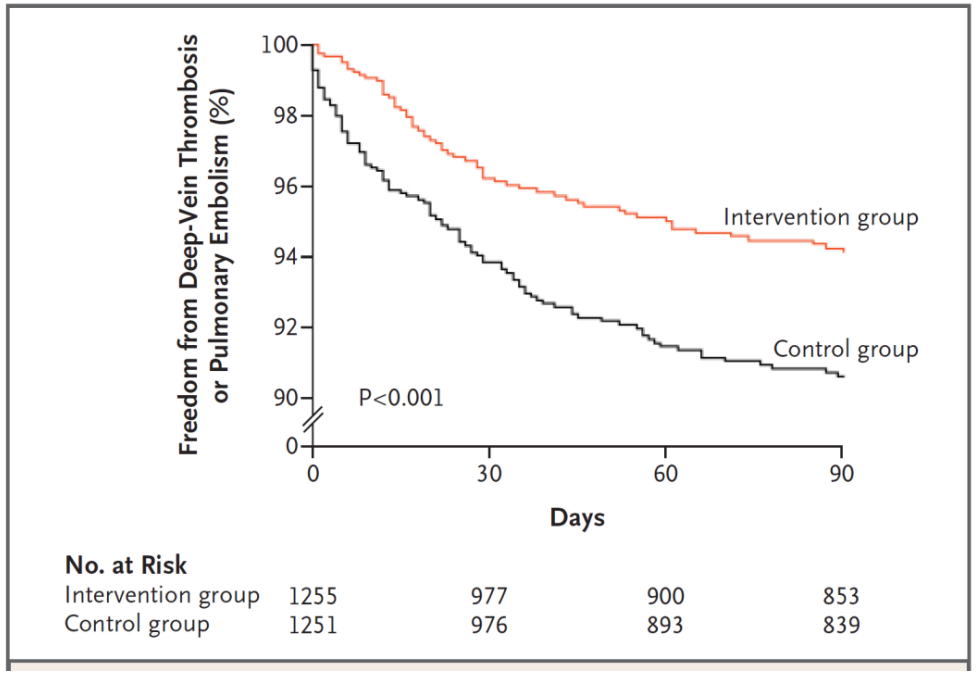
Electronic Alerts to Prevent Venous Thromboembolism among Hospitalized Patients

Nils Kucher, M.D., Sophia Koo, M.D., Rene Quiroz, M.D., M.P.H., Joshua M. Cooper, M.D., Marilyn D. Paterno, B.S., Boris Soukonnikov, M.S., and Samuel Z. Goldhaber, M.D.

RCT of EHR-generated alert for patients at high risk for VTE (n=2506) ~ MD had to acknowledge alert but could decide on whether to order or withhold

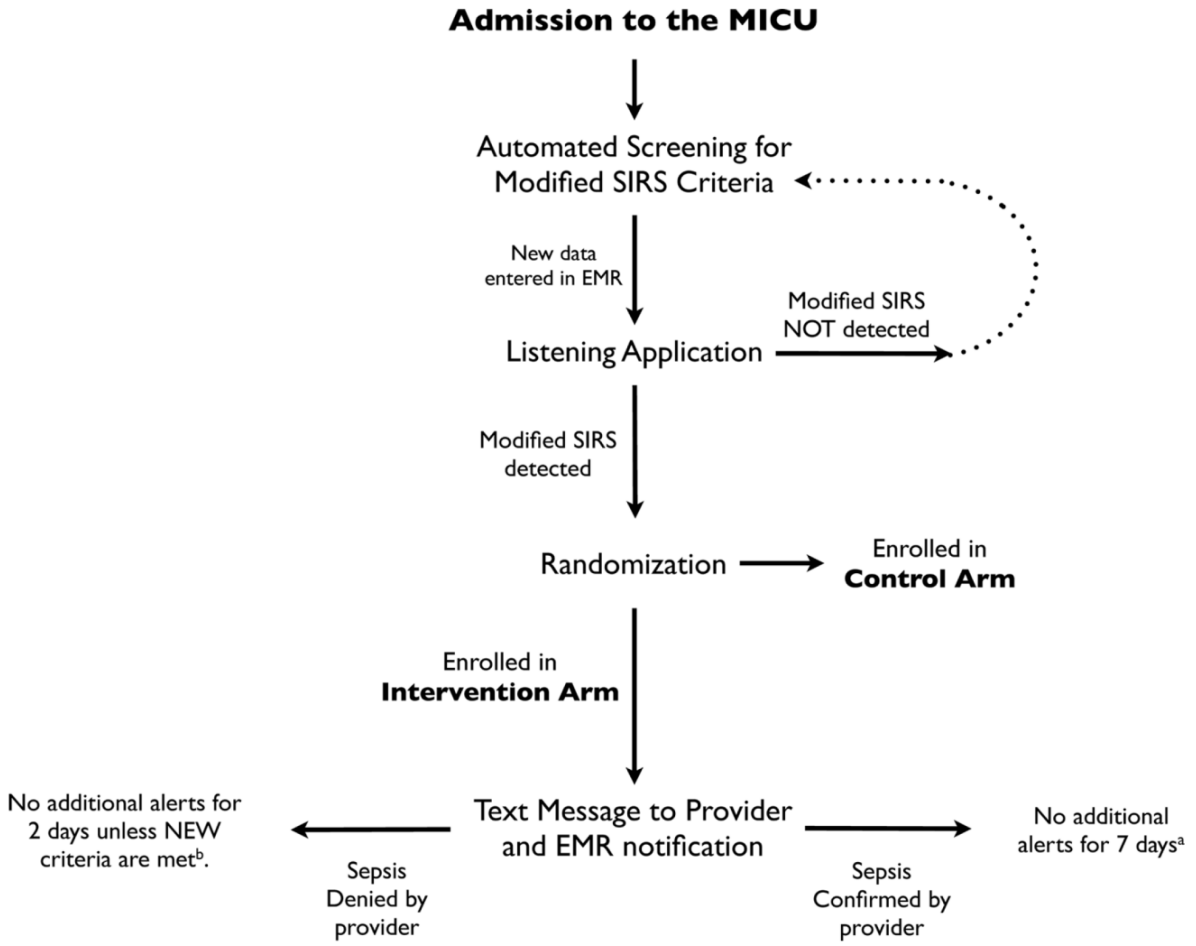
Table 2. Prophylactic Measures against Venous Thromboembolism.

Measure	Intervention Group (N=1255)	Control Group (N=1251)	P Value
	no. of patients (%)		
Mechanical	125 (10.0)	19 (1.5)	<0.001
Compression stockings	52 (4.1)	7 (0.6)	<0.001
Pneumatic boots	73 (5.8)	12 (1.0)	<0.001
Pharmacologic	296 (23.6)	163 (13.0)	<0.001
Unfractionated heparin	213 (17.0)	81 (6.5)	<0.001
Warfarin	28 (2.2)	41 (3.3)	0.11
Enoxaparin	55 (4.4)	41 (3.3)	0.18



Kucher et al NEJM 2005

Randomized trial of automated, electronic monitoring to facilitate early detection of sepsis in the intensive care unit*



Variable	Intervention	Controls	P
Time to Abx	6.0 (2.4-18.8)	6.1 (2.5-21.0)	0.95
6-hr fluid administration	1019 (1241)	964 (1196)	0.57
ICU stay	3.0 (2.0-5.0)	3.0 (2.0-4.0)	0.22
Hospital stay	5.7 (2.8-10.5)	4.7 (2.7-8.1)	0.08
Mortality	14%	10%	0.29

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No details of implementation and no concomitant CDS

Hooper et al CCM 2012

Vitaly Herasevich
Murat Yilmaz
Hasrat Khan
Rolf D. Hubmayr
Ognjen Gajic

Validation of an electronic surveillance system for acute lung injury

Geert Meyfroidt
Pieter Wouters
Wilfried De Becker
Dominiek Cottem
Greet Van den Berghe

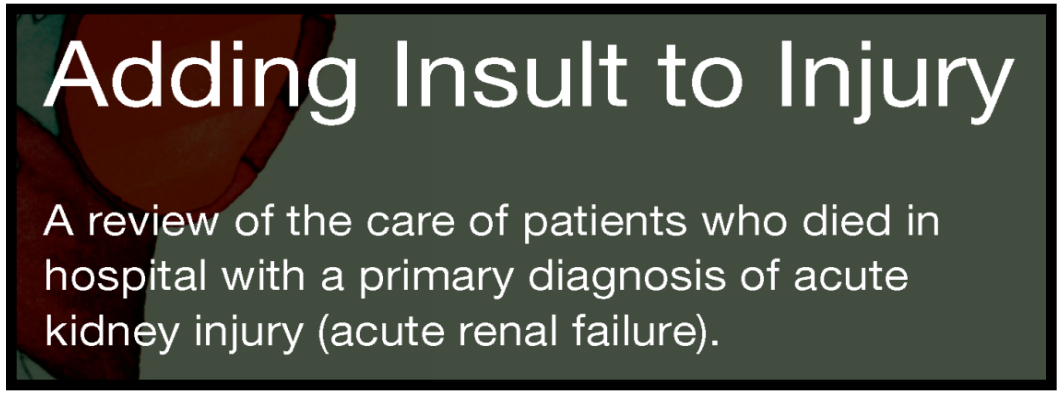
Impact of a computer-generated alert system on the quality of tight glycemic control

Development and validation of an electronic medical record-based alert score for detection of inpatient deterioration outside the ICU

Patricia Kipnis, PhD [a,b,*], Benjamin J. Turk, MAS [b], David A. Wulf, BS [b], Juan Carlos LaGuardia, MS [b], Vincent Liu, MD, MS [b,c], Matthew M. Churpek, MD, MPH, PhD [d], Santiago Romero-Brufau, MD [e], Gabriel J. Escobar, MD [b,f]

Why e-Alerts for AKI?

- AKI is a common syndrome and increasingly encountered in hospitalized patients
- AKI imposes significant risk for major morbidity and mortality
- AKI is costly and expensive
- AKI care is suboptimal



NCEPOD

Selected Findings of the 2009 NCEPOD report:

- ~ 50% of AKI care was considered poor
- ~ 45% had unacceptable delays in recognizing AKI
- ~ 20% of AKI was predictable and avoidable
- ~ 13% had complications of AKI missed, 17% of which were avoidable and 22% managed badly
- ~ 29% had inadequacies in clinical management of AKI

NCEPOD, AKI: Adding Insult to Injury, 2009 (Available at: www.ncepod.or.uk/2009aki.htm)

Physician Prevention of Acute Kidney Injury

Hala Yamout, MD,[a,*] Murray L. Levin, MD,[a] Robert M. Rosa, MD,[a] Kevin Myrie, MD,[b] Sara Westergaard, MD[c]

- Retrospective cohort of hospitalized patients screened for AKI
  - AKI found in 170/492 (34.6%)
- 30% (n=51/170) adjudicated to have AKI that was "preventable" by better care
- **Preventable causes for AKI identified:**
  - Inadequate prophylaxis prior to contrast
  - Hemodynamic instability
  - Inappropriate medication use
  - Multiple nephrotoxic insults

Yamout et al Am J Med 2015

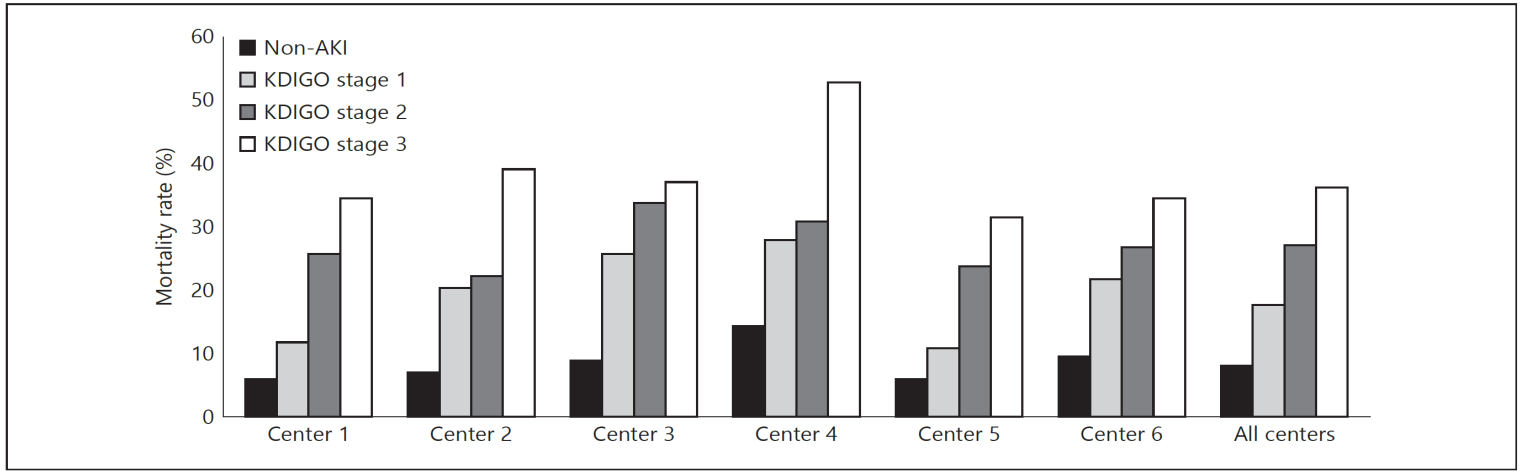
KDIGO Clinical Practice Guideline for Acute Kidney Injury

Preventative Intervention	Recommendation
Diuretics	Do not use (1C)
Low-dose Dopamine	Do not use (1A)
Fenoldopam (DA1-R agonist)	Do not use (2C)
Atrial Natriuretic peptide (ANP)	Do not use (2C)
Nesiritide (BNP)	Do not use (2C)
rh-IGF-1	Do not use (1B)
On vs. Off-pump CABG	Do not use (2C)
N-acetylcysteine (oral or IV)	Do not use (1A)
Remote ischemic preconditioning (RIPC)	No recommendation

This should reinforce how vital it is to focus on improving and optimizing "basic medical care" for patients at risk of or who develop AKI to ensure they receive best possible management.

Variation in Risk and Mortality of Acute Kidney Injury in Critically Ill Patients: A Multicenter Study

Independent variables	KDIGO classification		RIFLE classification	
	adjusted OR (95% CI)*	p value	adjusted OR (95% CI)*	p value
Center effect (Center 2 as ref.)		<0.001**		<0.001**
Center 1	4.27 (3.66–4.99)	<0.001	5.38 (4.55–6.37)	<0.001
Center 3	2.57 (2.19–3.03)	<0.001	3.35 (2.81–4.00)	<0.001
Center 4	5.61 (4.07–7.75)	<0.001	5.09 (3.64–7.12)	<0.001
Center 5	6.04 (5.23–6.98)	<0.001	7.54 (6.43–8.83)	<0.001
Center 6	2.69 (2.29–3.16)	<0.001	3.56 (2.99–4.26)	<0.001
Age in 5-year increment	1.06 (1.04–1.07)	<0.001	1.07 (1.05–1.08)	<0.001
Males	1.10 (1.01–1.21)	0.031	0.97 (0.88–1.06)	0.453
APACHE 3 in 5-point increment	1.22 (1.21–1.23)	<0.001	1.22 (1.21–1.23)	<0.001



- Retrospective study
  - n=15,132, 6 hospitals
- Incidence AKI ~ 15-44%
- RRT use ~ 5-12%
- Mortality ~ 20-36%
- Considerable variability:
  - Case-mix
  - Residual confounders
  - **Heterogeneity in care processes!**

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Srisawat et al Am J Nephrol 2014

Bagshaw *et al. Canadian Journal of Kidney Health and Disease* (2016) 3:5
DOI 10.1186/s40697-016-0103-z

Canadian Society of Nephrology/
Société canadienne de néphrologie
CSN/SCN

CANADIAN JOURNAL OF
KIDNEY HEALTH AND DISEASE
Journal canadien de la santé et de la maladie rénale

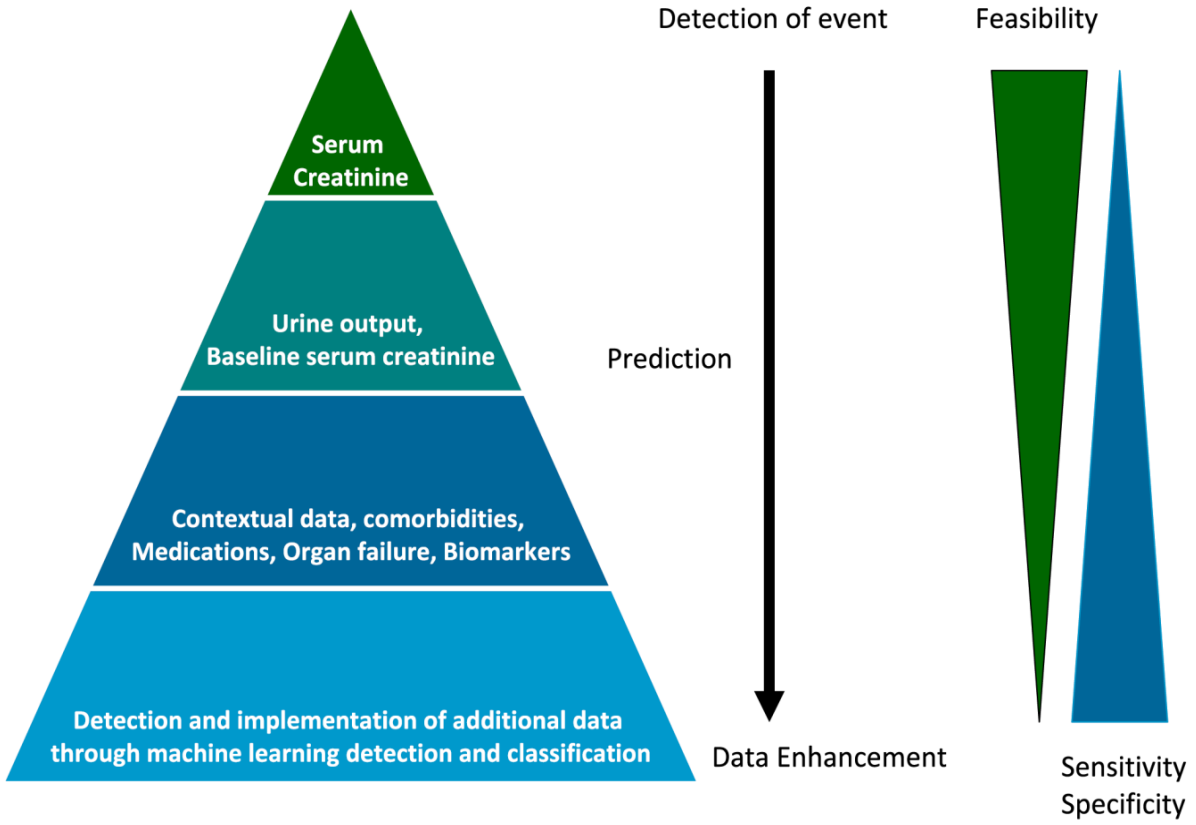
EDITORIAL Open Access

Acute kidney injury in the era of big data: the 15th Consensus Conference of the Acute Dialysis Quality Initiative (ADQI)

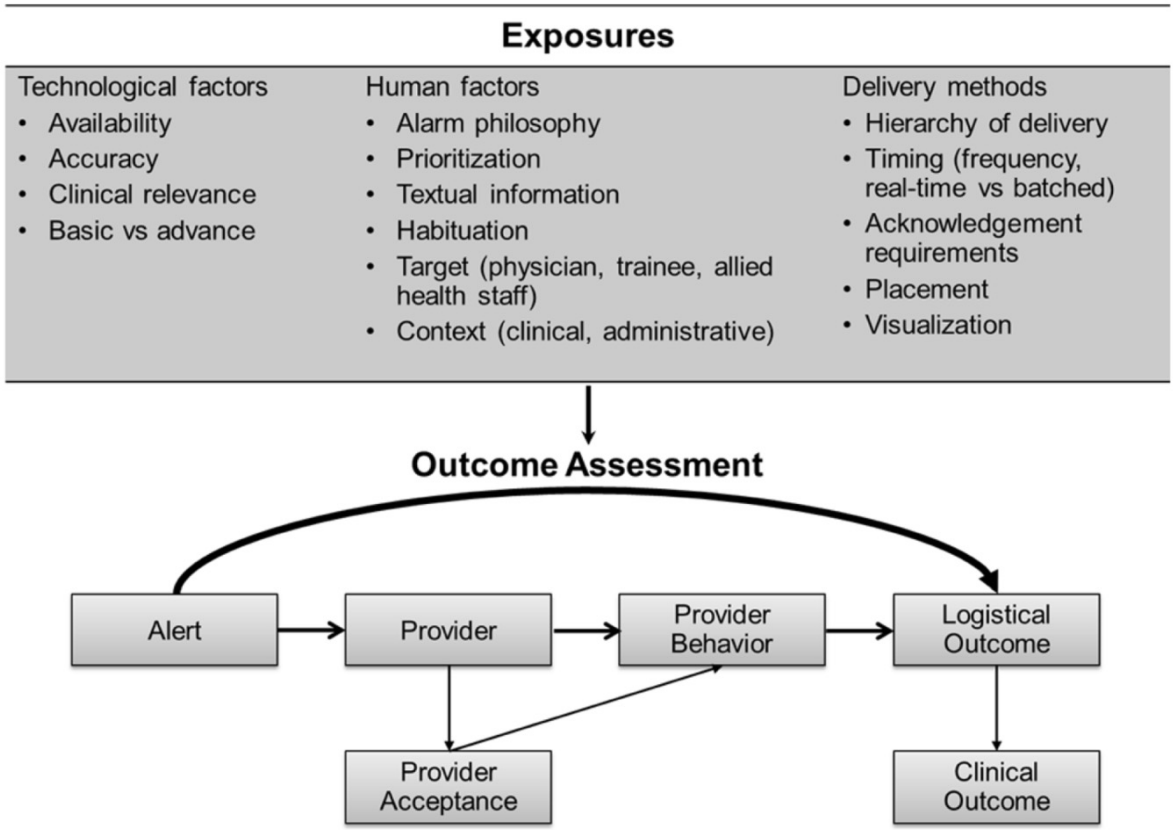
Sean M. Bagshaw[1*], Stuart L. Goldstein[2], Claudio Ronco[3], John A. Kellum[4] and for the ADQI 15 Consensus Group

Approaches to Derivation, Development and Refinement of Automated AKI Alerting Systems

Detection



Alerting



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James M et al Can J Kid Health Dis 2016, Hoste E et al Can J Kid Health Dis 2016

Impact of e-alert for detection of acute kidney injury on processes of care and outcomes: protocol for a systematic review and meta-analysis

- **Objectives:** Describe the methods for designing and implementing e-alerts for AKI, their impact on quality of care indicators and processes of care (i.e., monitoring, investigations), patient-centered outcomes (i.e., death, RRT) and health services use (i.e., ICU admission, hospital stay)
- **Design:** Systematic review + evidence synthesis
- **Search:** Comprehensive peer reviewed strategy
- **Study Selection:** 1) original data from RCTs; 2) all hospitalized patients; 3) studies where e-alert implemented for AKI; 4) reported impact on one process of care, patient outcome or measure of health services use

Registration: PROSPERO CRD42016033033 (www.crd.York.ac.uk/prospero)

Lachance et al BMJ Open 2016

Study	Trigger for e-alert	Timing	Target	Mode of Transmission	Generation	Intrusiveness*	Integration of Clinical Decision Support (CDS)			
							Diagnostic	Mechanisms for Harm	Follow-up	Format of vided
Rind										
McCo										d into rt
Colpa										d into rt
Selby										linked rnal ite
Morar										
Wilso										l to vebsite

1. E-alerts are significantly heterogeneous in design (i.e., detection algorithms, modes of alerting, degrees of intrusiveness)
2. E-alerts have have been variably implemented (i.e., seldom formal education, training or processes to ensure audit and feedback)
3. E-alerts have seldom included directed clinical decision support (CDS) and if included has not been context-specific and questionably feasible

*Based on our intrusiveness scale (see Appendix 1)

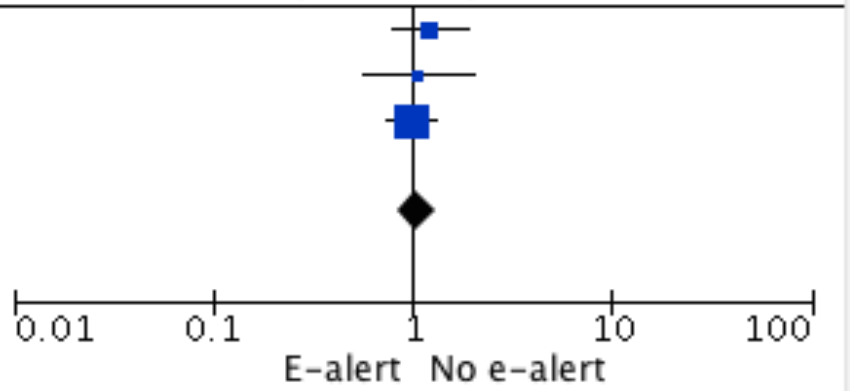
Lachance et al NDT 2016: In Press

Mortality

Study or Subgroup	E-alert Events	E-alert Total	No e-alert Events	No e-alert Total	Weight	Odds Ratio M-H, Random, 95% CI
Colpaert 2012	99	616	31	227	26.0%	1.21 [0.78, 1.87]
Moran 2015	27	100	23	89	11.7%	1.06 [0.56, 2.03]
Perry 2015	106	1201	107	1192	62.3%	0.98 [0.74, 1.30]
Total (95% CI)		**1917**		**1508**	**100.0%**	**1.05 [0.84, 1.31]**
Total events	232		161			

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 0.63$, df = 2 (P = 0.73); $I^2 = 0\%$

Test for overall effect: Z = 0.40 (P = 0.69)

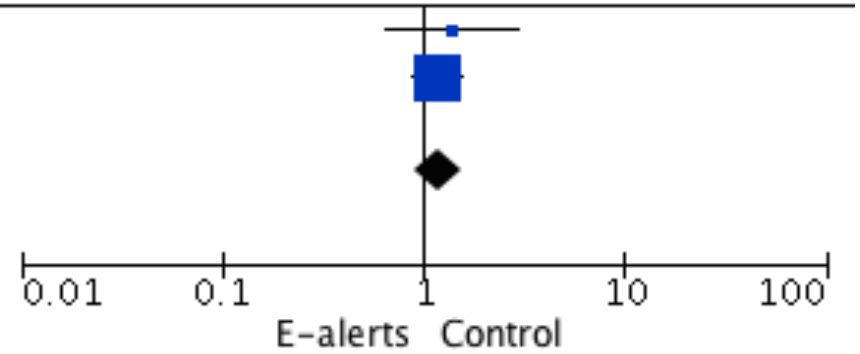


Use of Renal Replacement Therapy

Study or Subgroup	E-alerts Events	E-alerts Total	Control Events	Control Total	Weight	Odds Ratio M-H, Random, 95% CI
Colpaert 2012	33	616	9	227	13.2%	1.37 [0.65, 2.91]
Perry 2015	105	1201	90	1192	86.8%	1.17 [0.87, 1.57]
Total (95% CI)		**1817**		**1419**	**100.0%**	**1.20 [0.91, 1.57]**
Total events	138		99			

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 0.14$, df = 1 (P = 0.71); $I^2 = 0\%$

Test for overall effect: Z = 1.29 (P = 0.20)



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Lachance et al NDT 2016: In Press

Automated, electronic alerts for acute kidney injury: a single-blind, parallel-group, randomised controlled trial

F Perry Wilson, Michael Shashaty, Jeffrey Testani, Iram Aqeel, Yuliya Borovskiy, Susan S Ellenberg, Harold I Feldman, Hilda Fernandez, Yevgeniy Gitelman, Jennie Lin, Dan Negoianu, Chirag R Parikh, Peter P Reese, Richard Urbani, Barry Fuchs

- **Design:** RCT at single tertiary hospital, stratified by ward
- **Population:** Hospitalized patients to medical/surgical wards
- **Intervention:** Randomized (patient-level) to automated "disruptive" text-alert sent to covering providers (resident/NP) and unit pharmacists indicating new AKI (KDIGO) or standard-of-care (no alert)
- **Outcome:** Maximum change in SCr; use of RRT; death within 7 days

Perry et al Lancet 2015

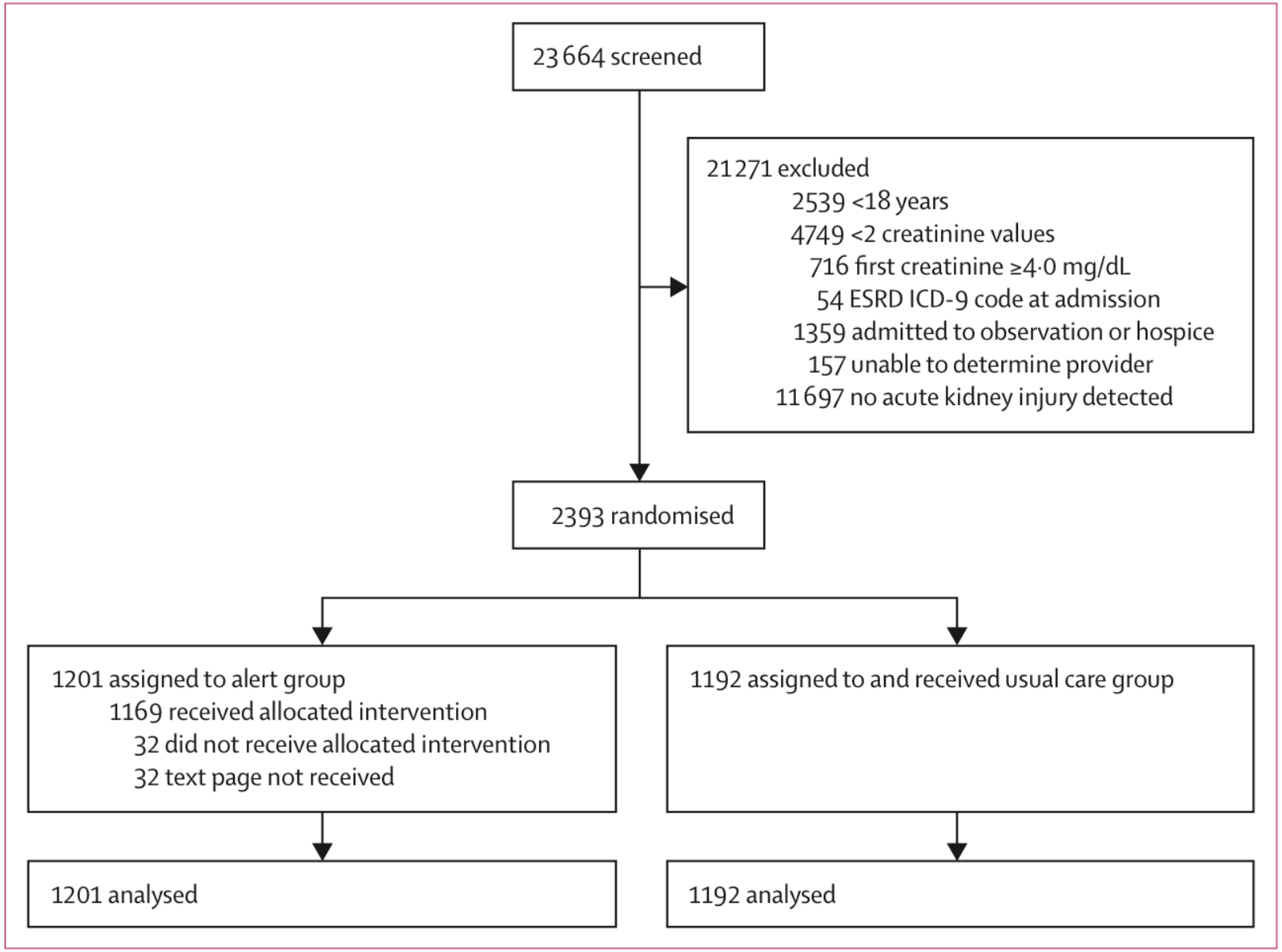
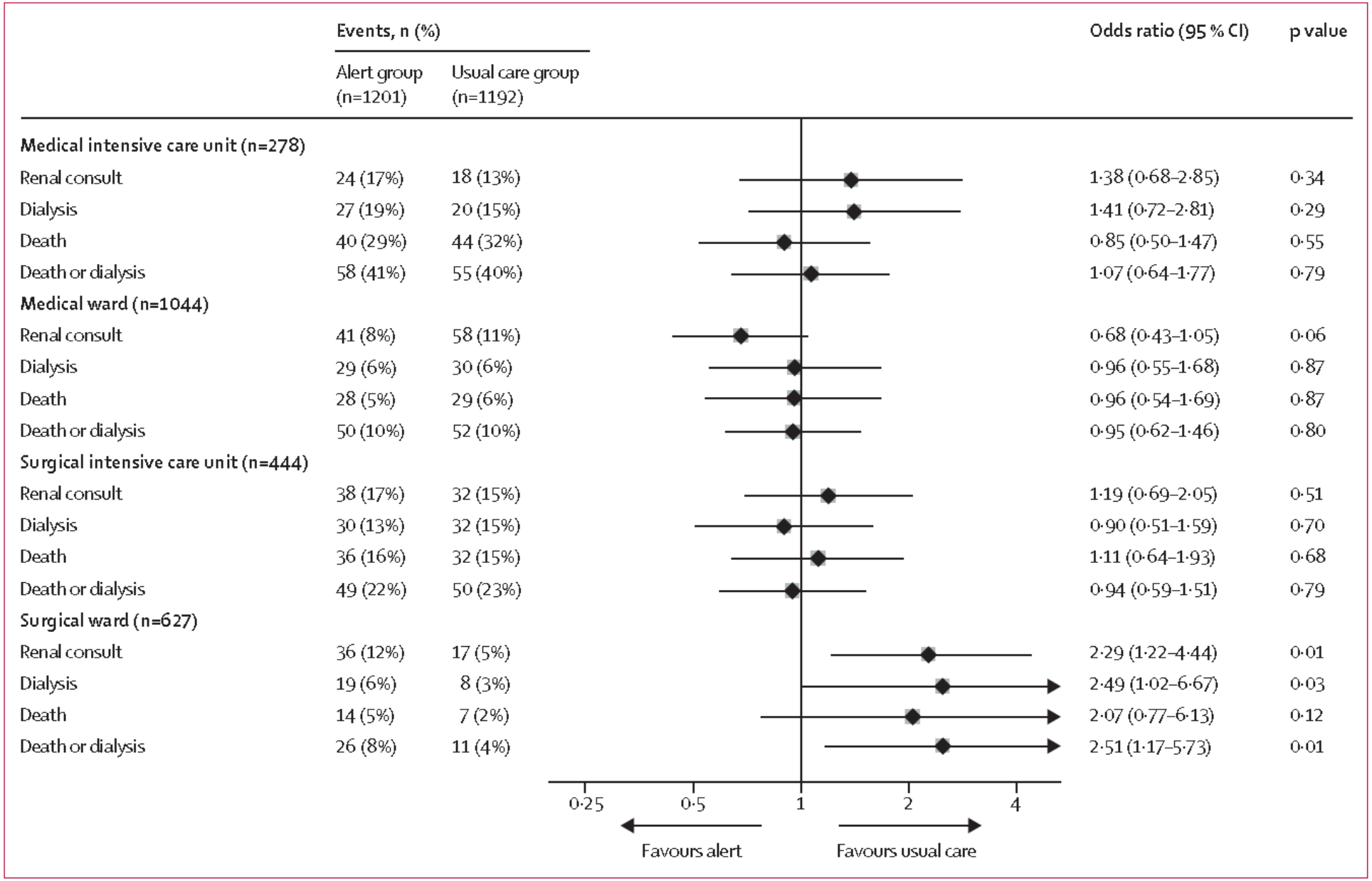


Figure 1: **Trial profile**

	Alert (n=1201)	Usual care (n=1192)	p value	Composite p value
7 days after randomisation				
Increase in creatinine from randomisation, %	0·0% (0·0–18·4)	0·6% (0·0–17·5)	0·81	0·88
Dialysis	87 (7·2%)	70 (5·9%)	0·18	
Death	71 (5·9%)	61 (5·1%)	0·40	
14 days after randomisation				
Increase in creatinine from randomisation, %	0·9% (0·0–20·6)	1·4% (0·0–20·2)	0·77	0·83
Dialysis	98 (8·2%)	79 (6·6%)	0·16	
Death	93 (7·7%)	85 (7·1%)	0·58	
30 days after randomisation				
Increase in creatinine from randomisation, %	1·3% (0·0–21·9)	2·1% (0·0–22·1)	0·65	0·89
Dialysis	104 (8·7%)	88 (7·4%)	0·26	
Death	106 (8·8%)	107 (9·0%)	0·85	

Perry et al Lancet 2015



Perry et al Lancet 2015

Secondary Process of Care Outcomes

- **Documentation of AKI** (~45%)
- **Investigations:**
  - Renal ultrasound (~8%)
  - SCr tests within 48 hr (2 [2-3])
- **Consultations:**
  - Nephrology referral (~12%)
- **Interventions:**
  - Aminoglycoside (~7%)
  - NSAID exposure (~7%)
  - Contrast exposure (~15%)
  - ACE/ARB exposure (~24%)
  - Fluid bolus (~36%)

No significant differences across all secondary care process outcomes for patients allocated to e-Alert vs. standard of care

Perry et al Lancet 2015

Process of Care Measures

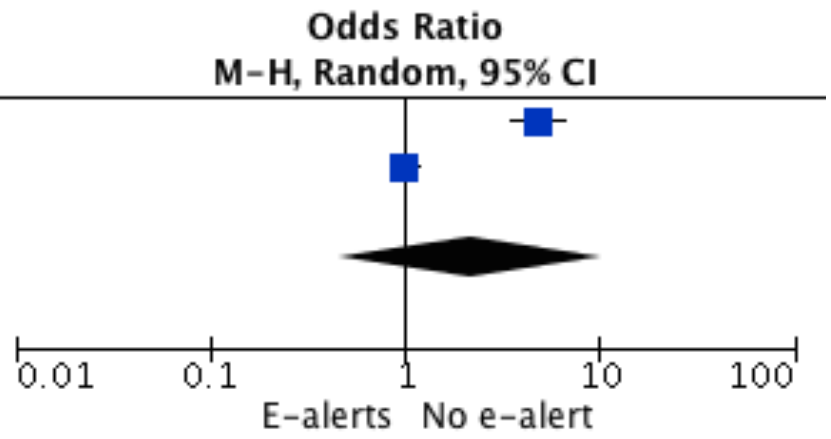
- **Primary:** Nephrotoxin dose-adjustment or discontinuation
- **Secondary:** Changes in frequency of monitoring, investigations or management (medication review; medical record documentation; fluid prescription; vasoactives or diuretic use; nephrology consult)

Prescription of Fluid Therapy

Study or Subgroup	Experimental Events	Total	Control Events	Total	Weight	Odds Ratio M-H, Random, 95% CI
Colpaert 2012	441	1416	49	569	49.6%	4.80 [3.51, 6.57]
Perry 2015	426	1201	422	1192	50.4%	1.00 [0.85, 1.19]
Total (95% CI)		**2617**		**1761**	**100.0%**	**2.18 [0.46, 10.31]**
Total events	867		471			

Heterogeneity: $Tau^2 = 1.24$; $Chi^2 = 76.26$, df = 1 ($P < 0.00001$); $I^2 = 99\%$

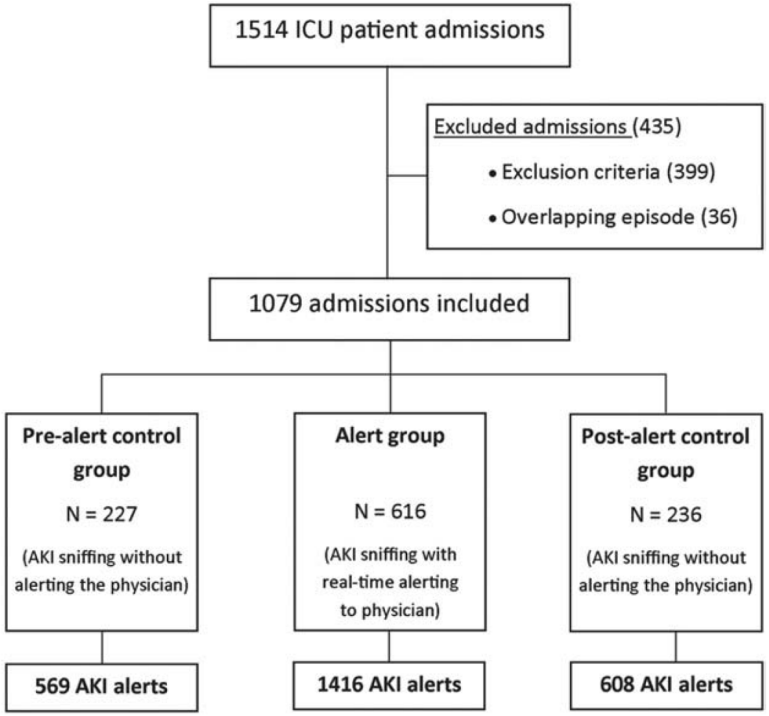
Test for overall effect: $Z = 0.98$ ($P = 0.32$)

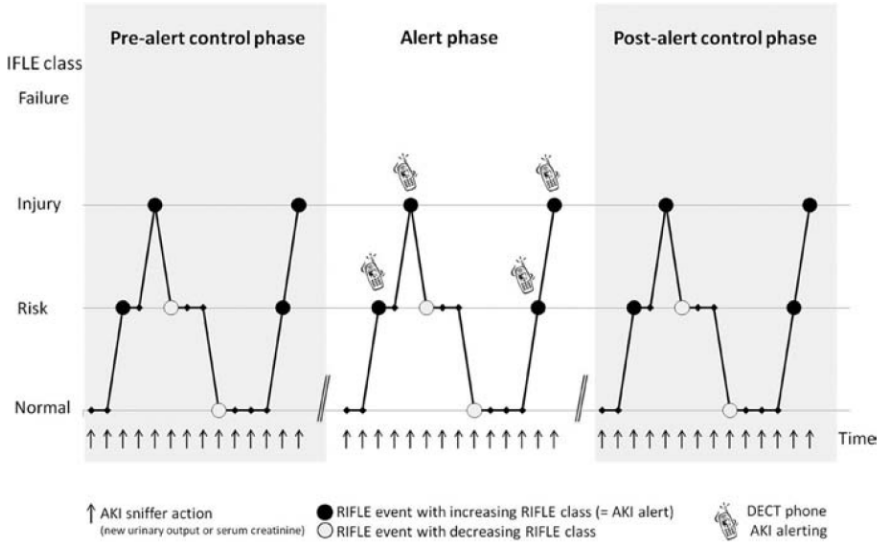


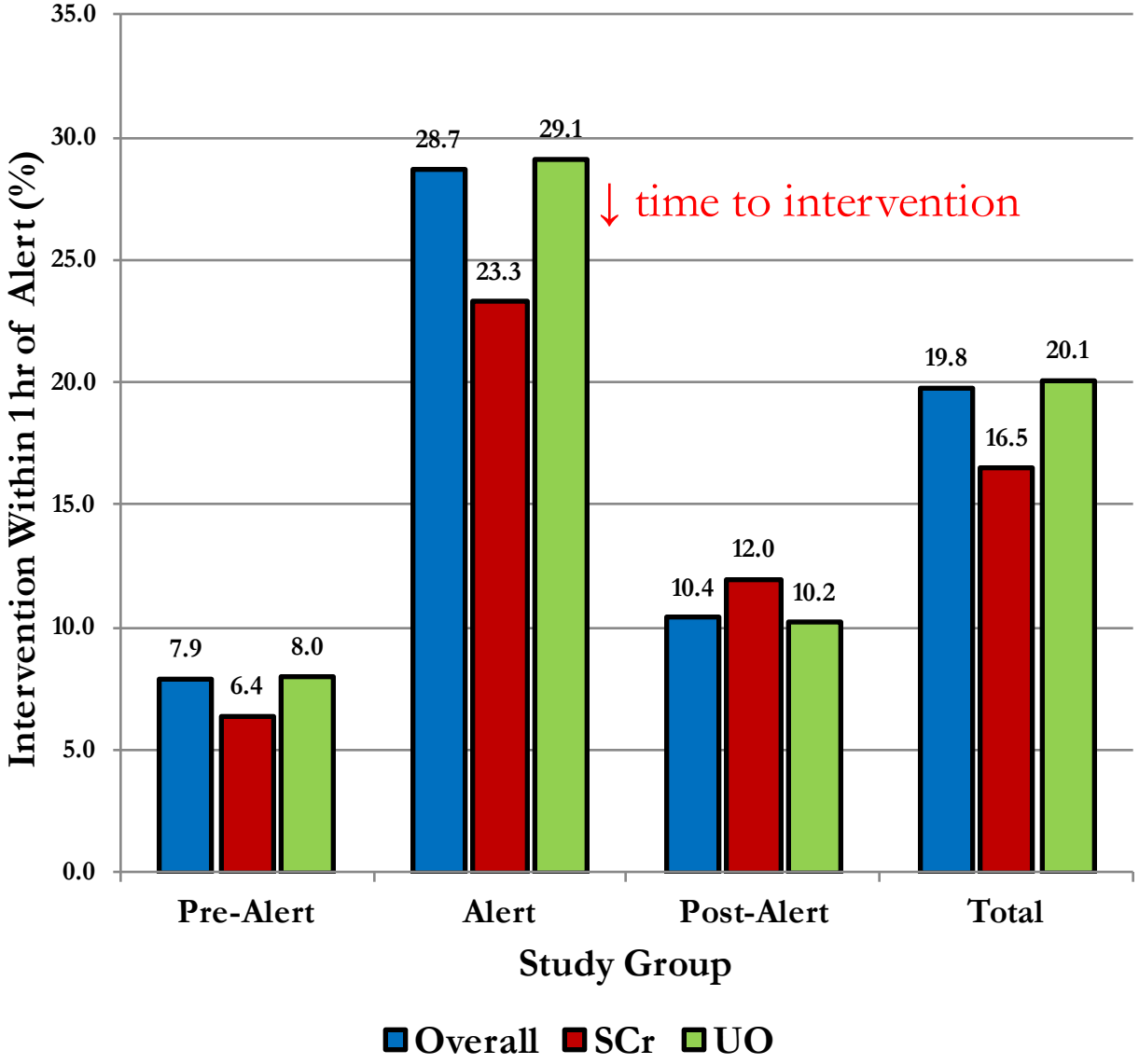
Lachance et al NDT 2016: In Press

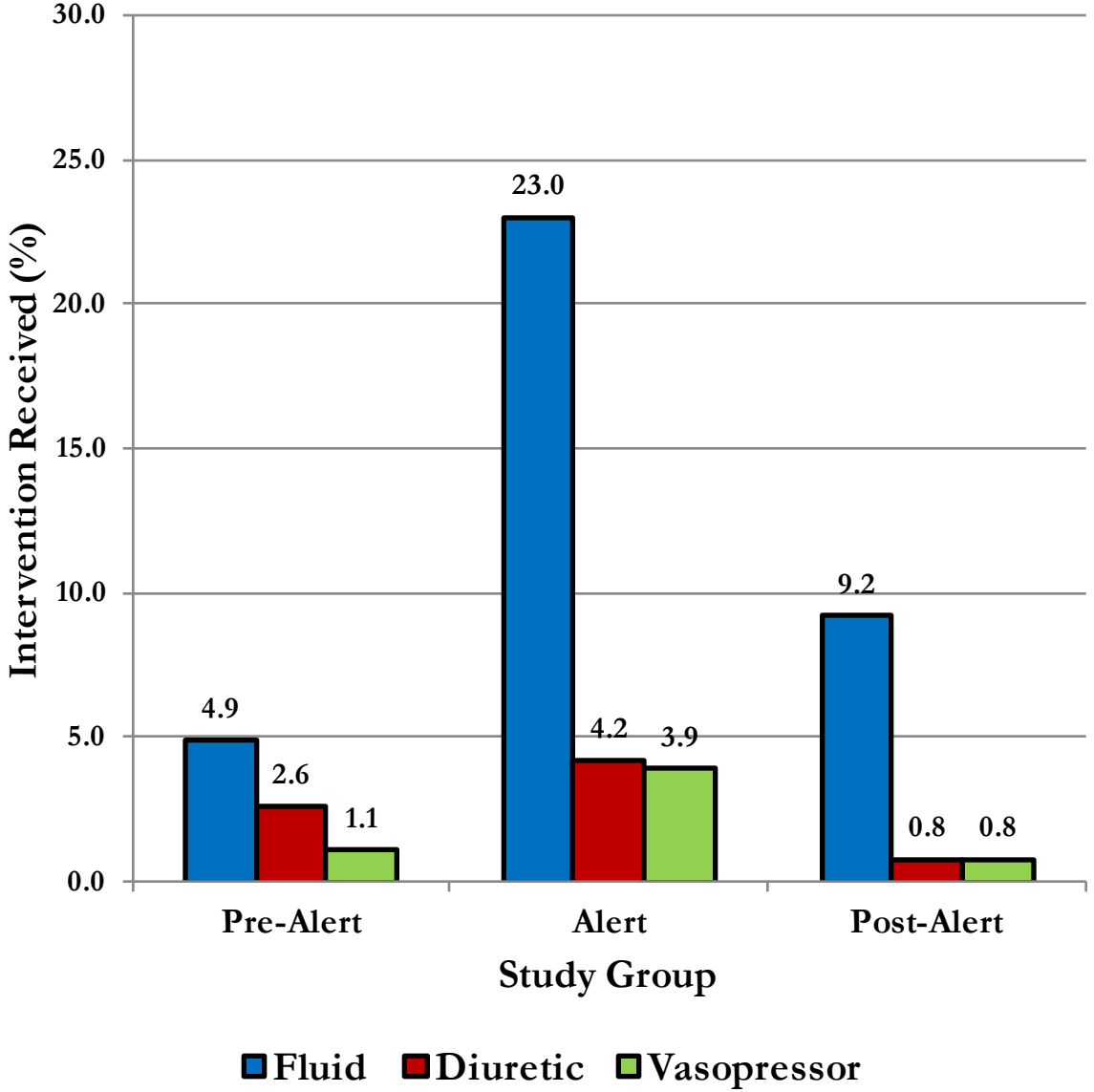
Impact of real-time electronic alerting of acute kidney injury on therapeutic intervention and progression of RIFLE class*

Kirsten Colpaert, MD; Eric A. Hoste, MD, PhD; Kristof Steurbaut; Dominique Benoit, MD, PhD; Sofie Van Hoecke, PhD; Filip De Turck, PhD; Johan Decruyenaere, MD, PhD









92.3% of all ALERTS were based on urine output

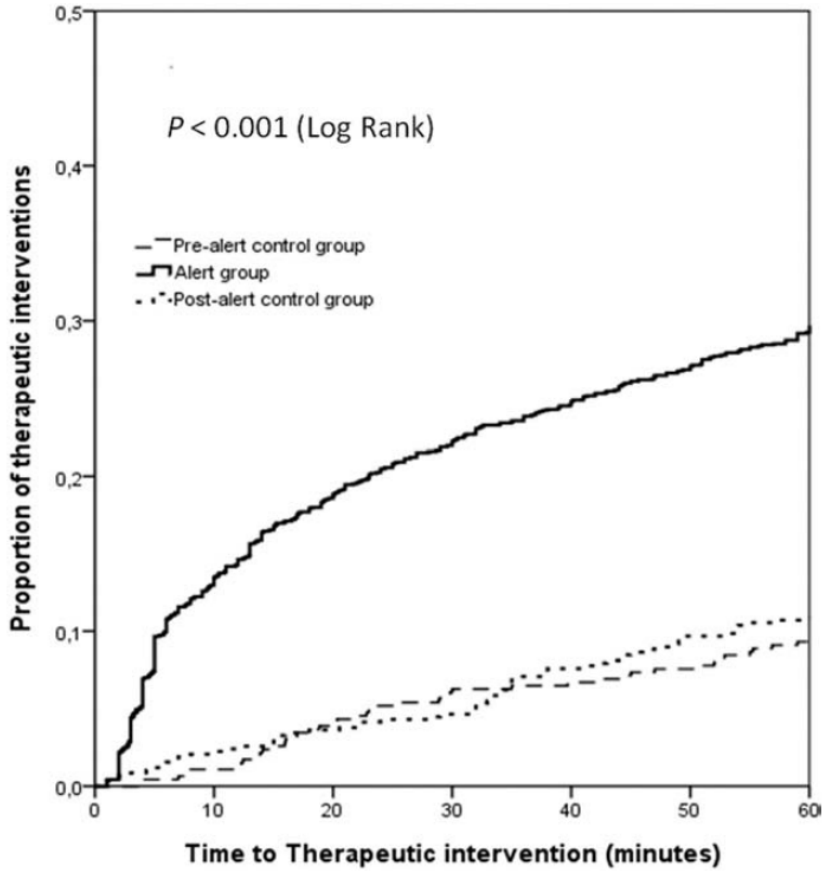
Colpaert et al CCM 2012

Impact of real-time electronic alerting of acute kidney injury on therapeutic intervention and progression of RIFLE class*

Kirsten Colpaert, MD; Eric A. Hoste, MD, PhD; Kristof Steurbaut; Dominique Benoit, MD, PhD; Sofie Van Hoecke, PhD; Filip De Turck, PhD; Johan Decruyenaere, MD, PhD

Study outcomes:

- ↑ proportion during e-alert phase had return to baseline SCr
- No differences in proportion receiving RRT, ICU stay, or mortality



Colpaert et al CCM 2012

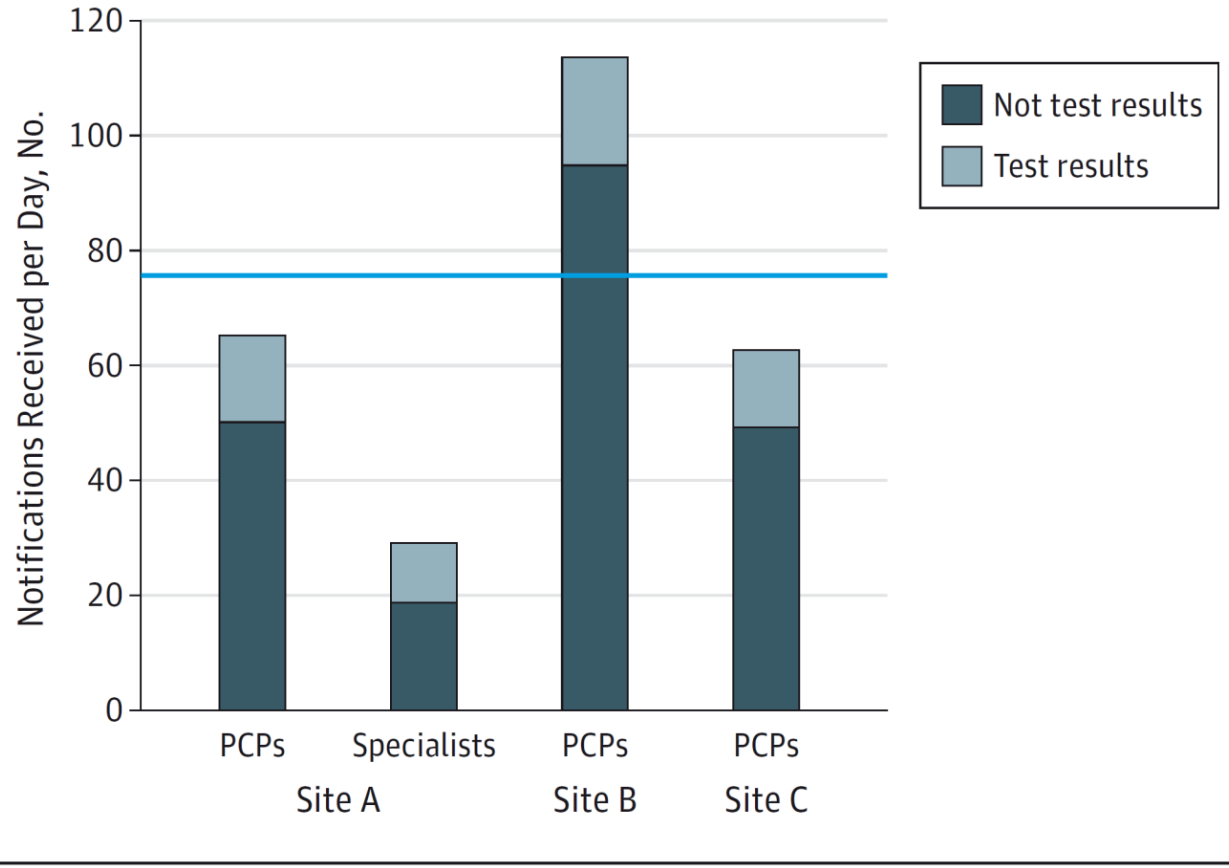
e-Alert Implementation Strategies

- Few studies employed a formal strategy to implement e-alerts into practice
  - No to little education, instruction/training or processes of audit-feedback (QA/QI/implementation methodology) introduced before or during
  - No strategy for ensuring sustainability before or during
- Significant confounder of e-alert success in negative studies
- Little appreciation for the impact of AKI-specific alert in context of "competing" alerts within given EHR or clinical setting

The Burden of Inbox Notifications in Commercial Electronic Health Records

- EHR-based notices to physicians are growing
- ↑ volume creates difficulty for discerning important vs. irrelevant information
- Translates into ↑ time spent reviewing and uncompensated workload

Figure. Quantities and Types of Notifications Received by Site and Physician Role



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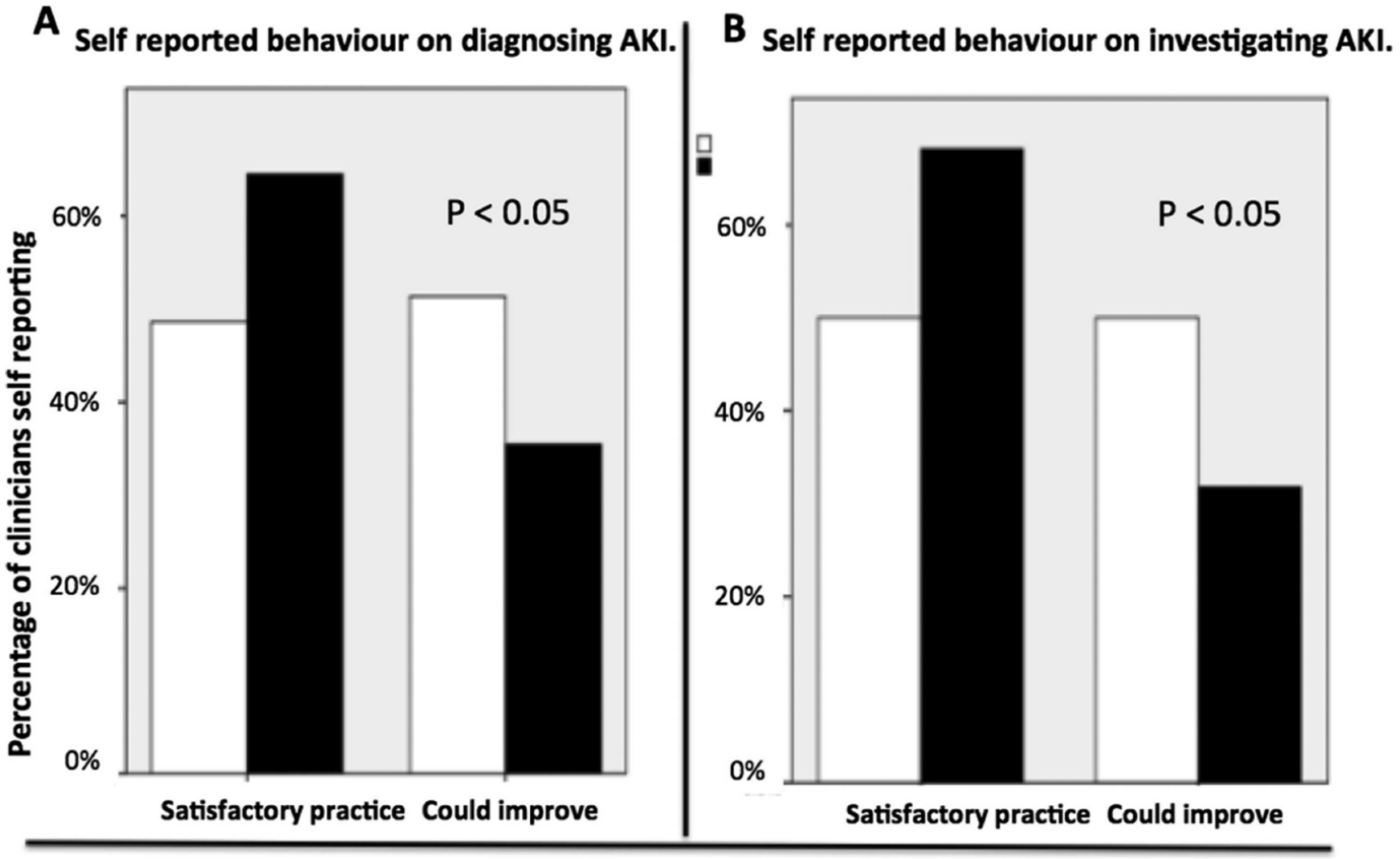
Murphy et al JAMA IM 2016

An educational approach to improve outcomes in acute kidney injury (AKI): report of a quality improvement project



- Inadequate implementation strategies may be confounder in trials in our review
- Providing multifaceted education can improve provider satisfaction and confidence in their ability to diagnose and manage AKI.

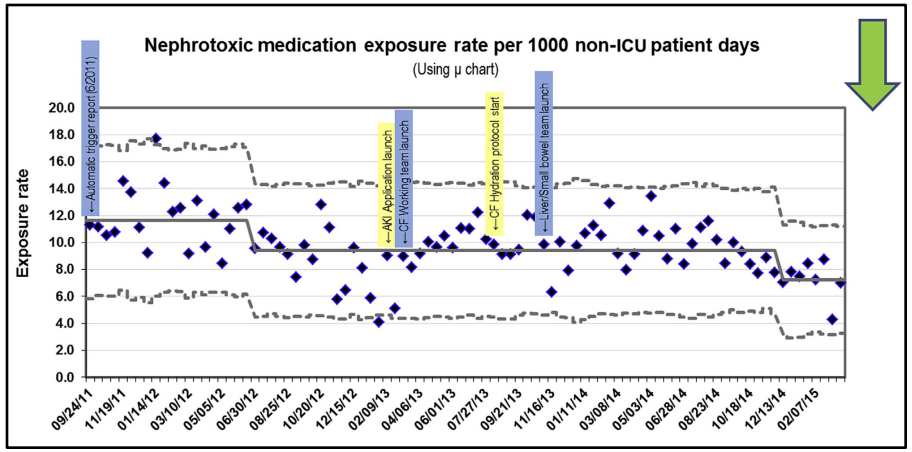
Xu et al BMJ Open 2014

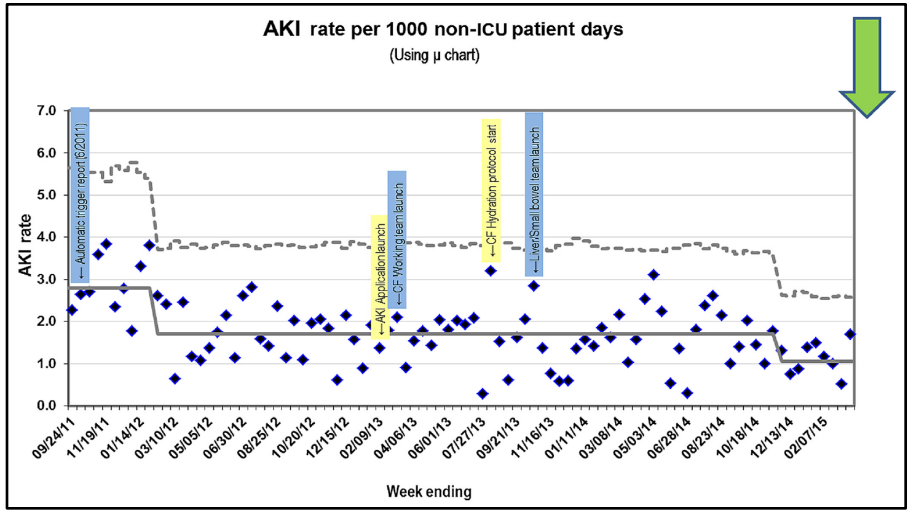
e-Alert Integration of Decision Support

- Integration of clinical decision support (CDS) across studies has been highly variable
  - Specific CDS may guide context-specific management (i.e., investigations, monitoring, interventions)
  - More relevant for "non-AKI" experts (i.e., non-nephrologists)
- May also be a significant confounder of e-alert success in negative studies

A sustained quality improvement program reduces nephrotoxic medication-associated acute kidney injury

- **Study:** Prospective QI project (2011-2015)
- **Population:** 2,358 admissions (n=1,749)
- **Exposure:** Hospitalized children receiving either AG >= 3 days or >= 3 nephrotoxins (3,243 exposures)
- **Intervention:** EHR alert + CDS (pharmacy driven) to monitor SCr + dose-adjust
- **Outcomes:**
  - ↓ exposure rate by 38%
  - ↓ AKI rate by 64%
  - Avoided 398 episodes AKI





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Goldstein SL et al KI 2016

Earlier intervention for acute kidney injury: evaluation of an outreach service and a long-term follow-up

Type	Category	Number	Subtotal
Fluid balance-related recommendations	Intravenous fluid recommendations	102	156
	Monitor fluid balance and/or assess volume status	33	
	Urinary catheterization	21	
Investigational recommendations	Recheck urea, creatinine and electrolytes	150	289
	Test urine dipstick	128	
	Arrange urinary tract ultrasound or other investigations	11	
Escalation and palliative care decisions and recommendations		16	16
Care pathway recommendations	Primary team to review clinical situation	23	45
	Patient to be seen as outpatient or other pathway advice	22	
General medical recommendations	Physiotherapy	20	35
	Nutritional review or sepsis six [11, 12]	15	
Drug recommendations			227
Drug cessation	Angiotensin converting enzyme inhibitors/angiotensin receptor blockers	65	
	Aspirin	30	
	Diuretics (non-potassium sparing)	21	
	Non-steroidal anti-inflammatory drugs (NSAIDs)	19	
	Enoxaparin (low-molecular weight heparin)	19	
	Other hypotensive agents	18	
	Potassium-sparing diuretics	13	
	Metformin	10	
	Other drugs (aminoglycosides, aciclovir, calcineurin inhibitors, NSAID gels and Hartmann's solution)	16	
Drug dose reduction	Opioids	8	
Drugs to avoid (when use likely)	NSAIDs or iodinated contrast	8	

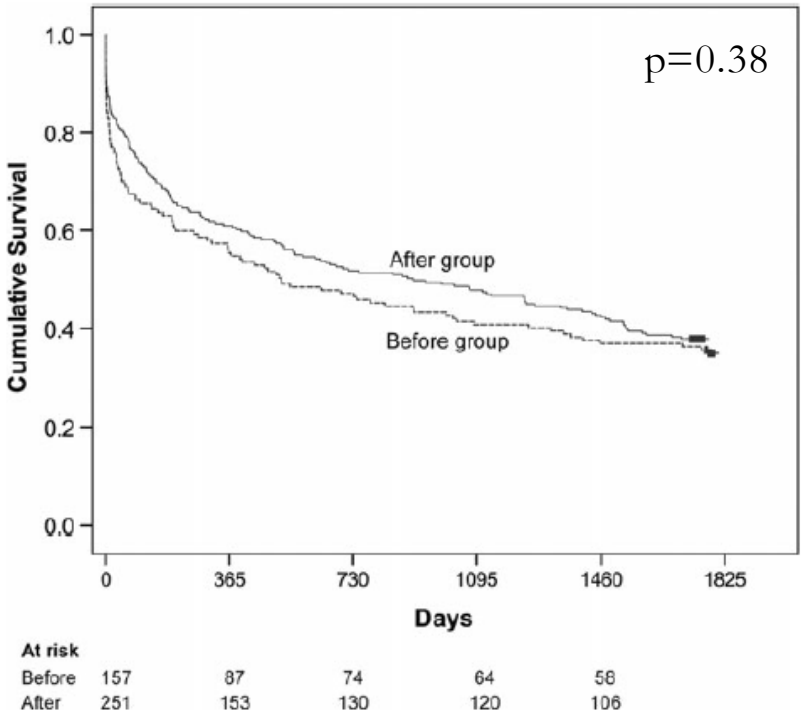

FIGURE 2: Survival of before and after groups.

Outreach call (Nephrology/RN) for precision advice successful in ~88% after median 14 hr

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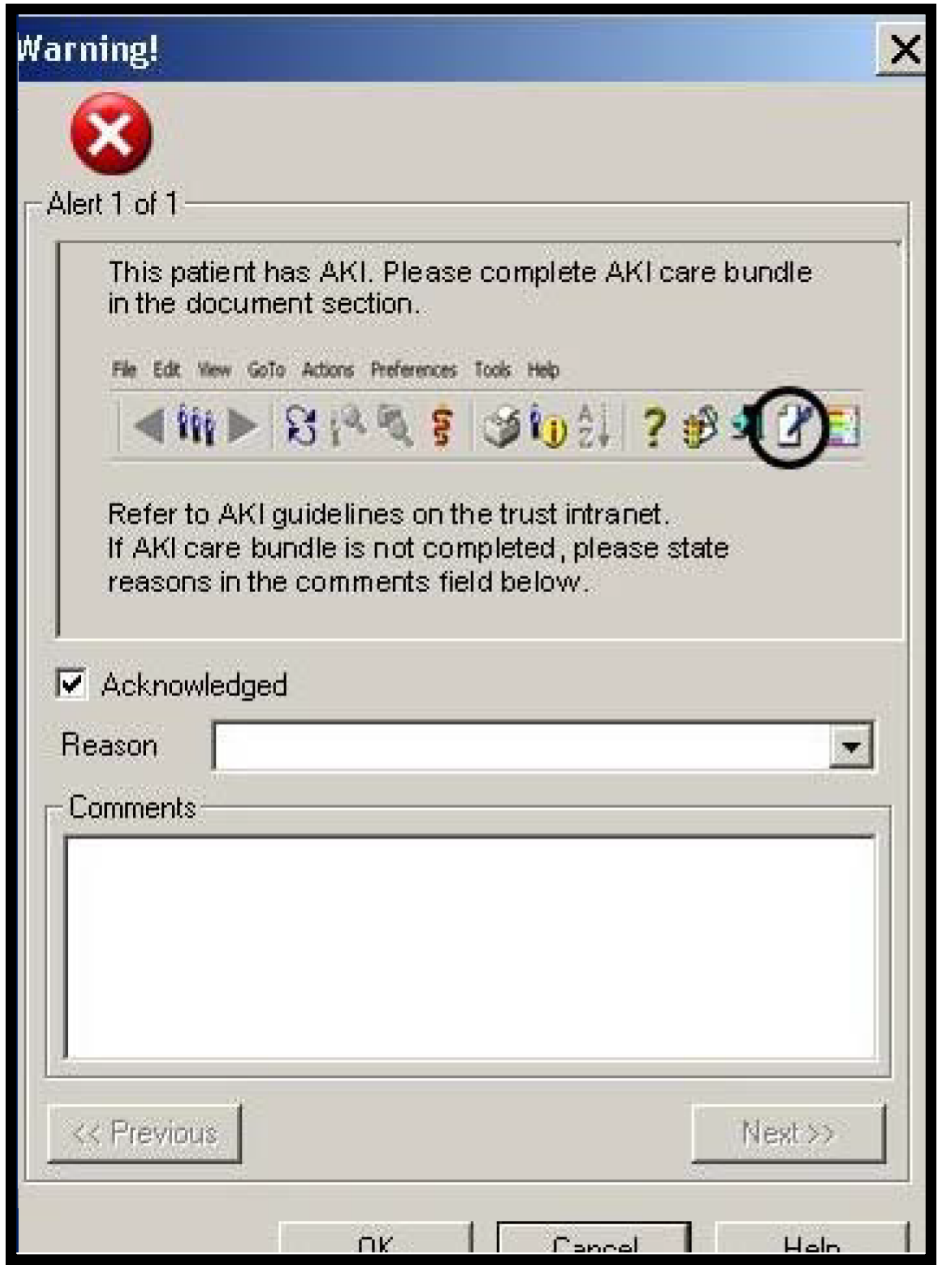
No description of whether changes in care processes occurred or not

Thomas et al NDT 2015

Impact of Compliance with a Care Bundle on Acute Kidney Injury Outcomes: A Prospective Observational Study

- **Design**: Before/After Study (11 months)
- **Population**: 2,297 hospitalized patients (2,500 AKI episodes)
- **Intervention**:
  - AKI e-alert (interruptive) linked to AKI-specific "care bundle"
  - Interruptive e-alert triggered by attempt to order blood work or medication in a patient identified as having AKI
  - e-alert would warn provider about AKI and request "care bundle" be completed
  - Once "care bundle" completed – provider could order tests or medications
  - e-alert could be overridden only after provider imputed reason

Kolhe et al PLoS One 2015



Derby Hospitals NHS Foundation Trust

AUDITS - The Acute Kidney Injury Care Bundle

Patient sticker

Date .....

Time .....

Ward.. .....

This care bundle applies to initial care of those admitted with Acute Kidney Injury (AKI)

	Action	Parameter	Sign
A	**A**ssess History & examine **(VENUS)**	• **V**olume depletion • **E**soteric history - 3H &3R (Haemoptysis, Haemolysis, Hypercalcemia, Rash, Recent vascular intervention, raised CK) • **N**ephrotoxins – check medications • **U**rinary symptoms – outflow obstruction, haematuria, oliguria, colic • **S**epsis	
U	**U**rine dispstick	• No blood or protein – Pre renal • Blood & protein – Renal • Only blood – post renal or renal	
D	Clinical **D**iagnosis	• Think cause of AKI as Pre renal, Renal and Post renal • Classify and document AKI as per AKIN stage.	
I	**I**nvestigations	• U+E, bicarbonate, Glucose, ANCA, SEP, ECG, CXR, MSU or blood & urine cultures depending on clinical suspicion.	
		• USS to r/o post renal cause.	
T	**T**reatment - **PUMP**	• **P**erfusion – ensure euvolemic status, ionotropes if required	
		• **U**nderlying cause – – remove nephrotoxins, antibiotics for sepsis	
		• **M**onitor – EWS, volume status, Daily U+Es	
		• **P**revent complications - fluid overload, adjust doses of medications, sepsis including removal of potential sources of sepsis.	
S	**S**eek advice	Seek renal advice (bleep 8121) for all AKI stage 3 and, if esoteric cause for AKI is suspected - as per the Trust guideline. *Refer to "DONUT" on the website* Consider HDU/ITU according to severity	

AKI Care Bundle

Entered:_____

Completed:_____

Instructions

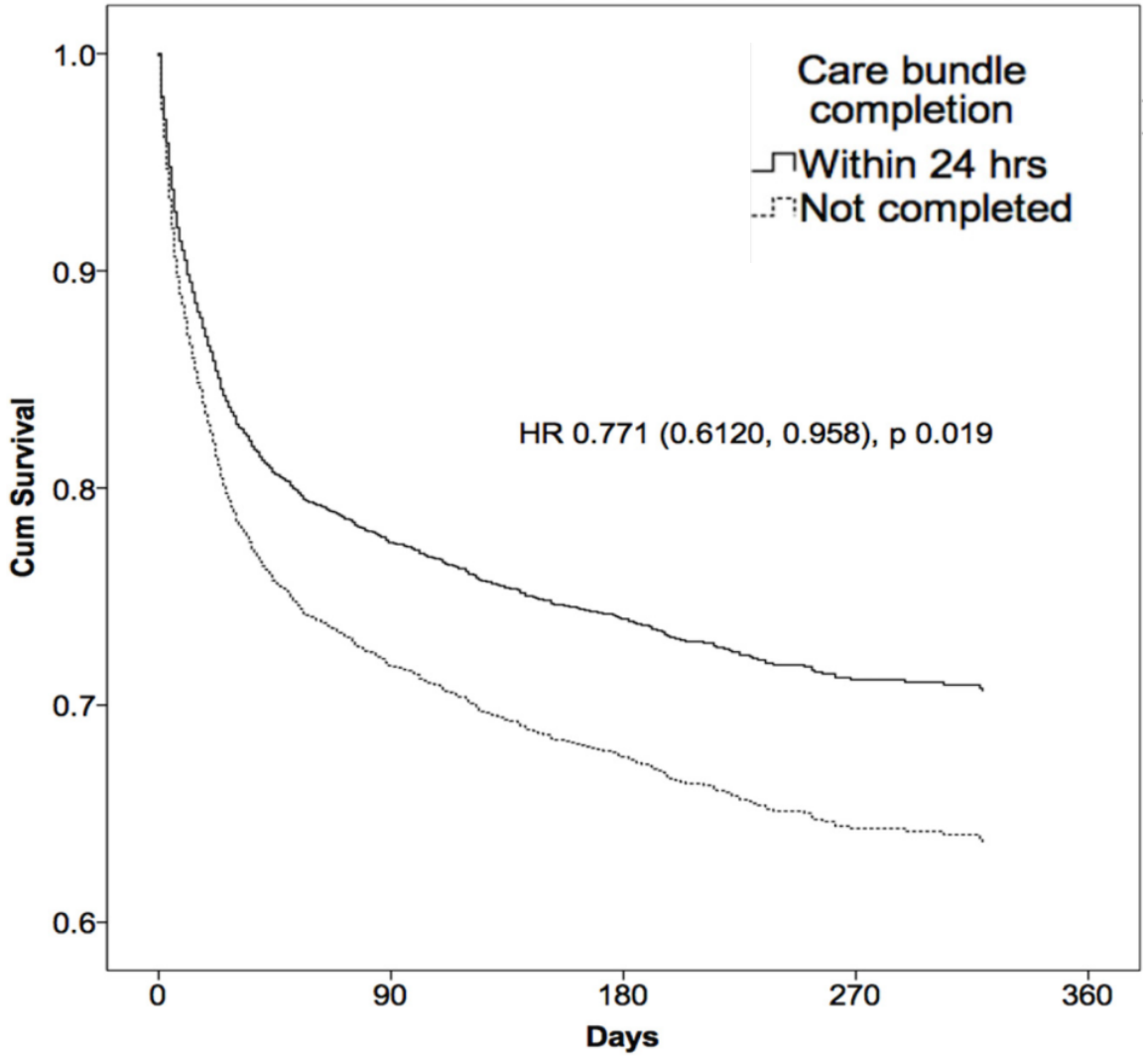
1. Attach patient label and fill in Box A
2. Detach square sticker, and place in notes and follow.
3. Detach round sticker, and place in front of notes folder.
4. File this backing sheet (with patient label) in designated audit tray.

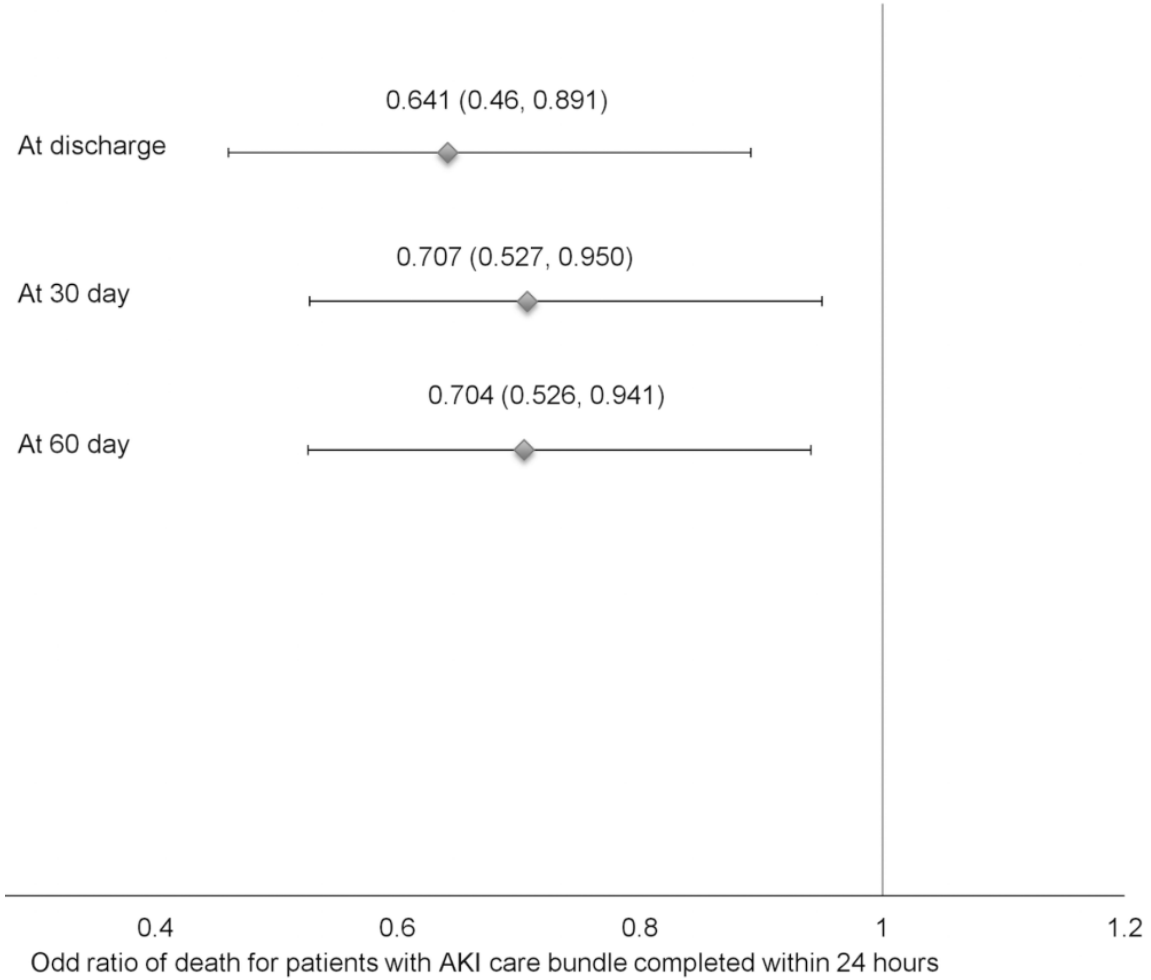
Kolhe et al PLoS One 2015

- Overall compliance with Care Bundle ~ 12.2%
- Pre/post-interruptive e-alert compliance ~ 2.2% vs. 21.6%
- AKI stage 3 ~ 15.7% completed bundle within 24 hr
- 70.9% had "appropriate" treatment measures implemented

	Care Bundle completion		P value
	Within 24 hours	Not completed or completed after 24 hours	
Proportion of AKI episodes with progression to higher AKI stage	9 (3.9%)	149 (8.1%)	0.02
Length of stay in days†	11.2 (9.9, 12.4)	12.5 (11.9, 13.1)	0.098
In-hospital case fatality	55 (18%)	506 (23.1%)	0.046
30-day case fatality	77 (25.2%)	626 (28.5%)	0.219
60-day case fatality	83 (27.1%)	673 (30.7%)	0.205

Kolhe et al PLoS One 2015





Mortality associated with completion of care bundle within 24 hours of AKI detection/alert versus delayed or no completion

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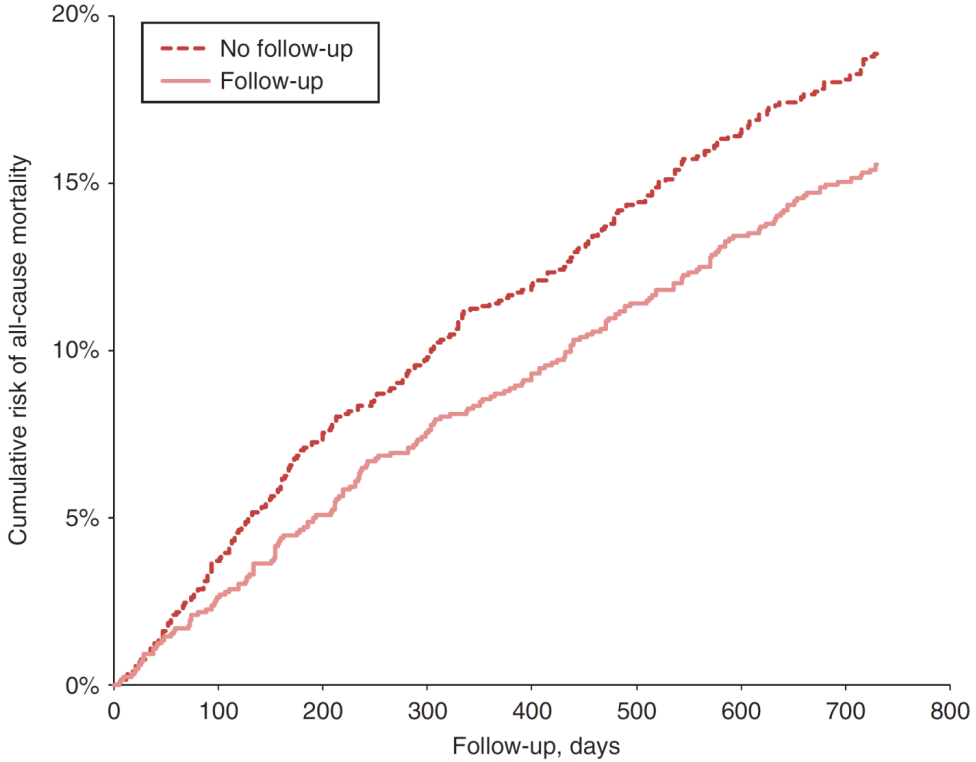
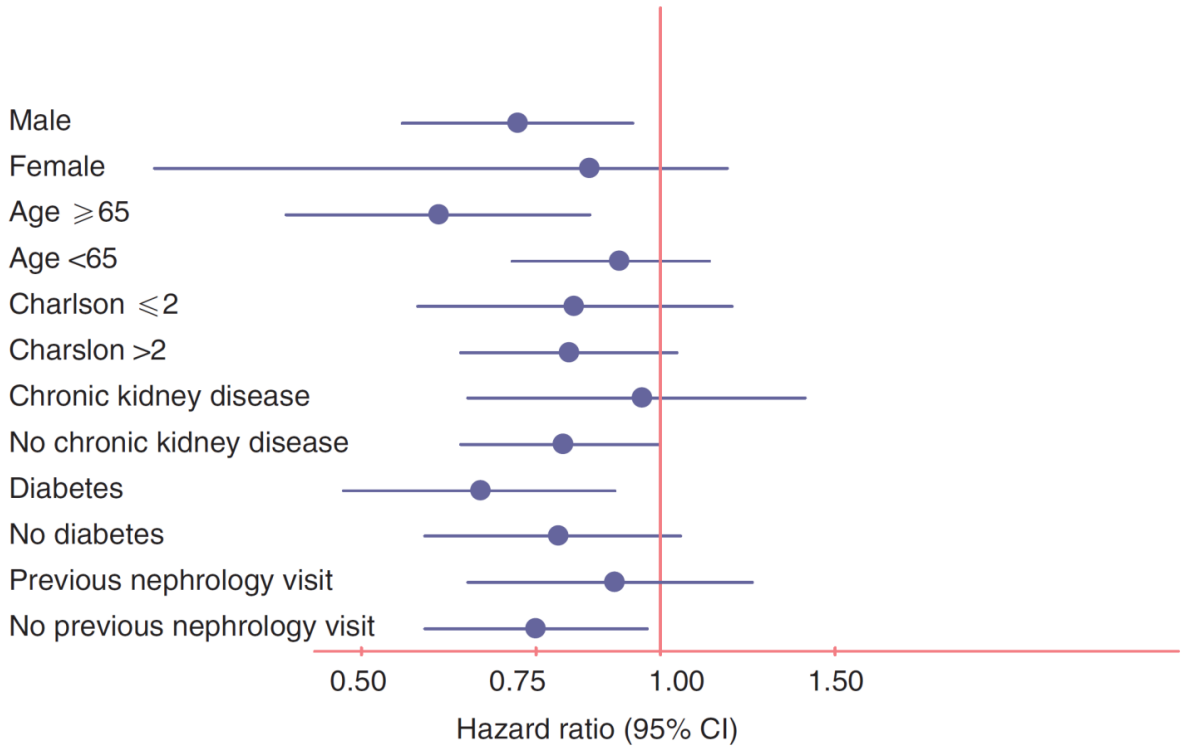
Kolhe et al PLoS One 2015

Nephrologist follow-up improves all-cause mortality of severe acute kidney injury survivors

Retrospective matched cohort study using linked administrative data from Ontario, Canada of RRT-treated AKI survivors





Early Nephrologist follow-up (within 90 days of discharge) associated with reduced all-cause mortality (adj-HR 0.76; 95% CI, 0.62-0.93)

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Harel et al KI 2013

Summary

- AKI is common and increasing, contributes to less favorable patient outcomes and susceptible to suboptimal quality of care
- E-alerts can theoretically notified providers earlier of risk for or overt AKI
- Available evidence has shown variable impact of E-alerts in response to AKI on care processes and no meaningful improvement in patient outcomes or health services use
- E-alerts are likely context-specific and further rigorous evaluation is needed before widespread routine implementation

Thanks for Your Attention

Questions?

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