Development of guidance on the timeliness in response to Acute Kidney Injury Warning Stage Test Results for adults in primary care: an appropriateness ratings evaluation

'THINK KIDNEYS'

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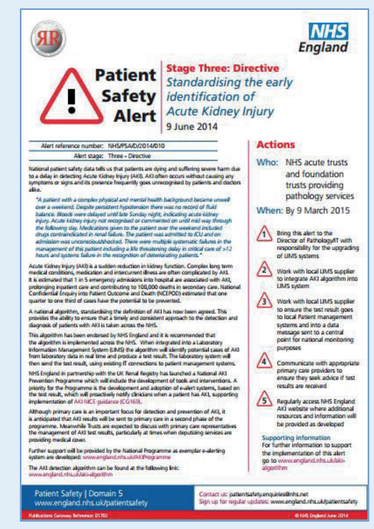

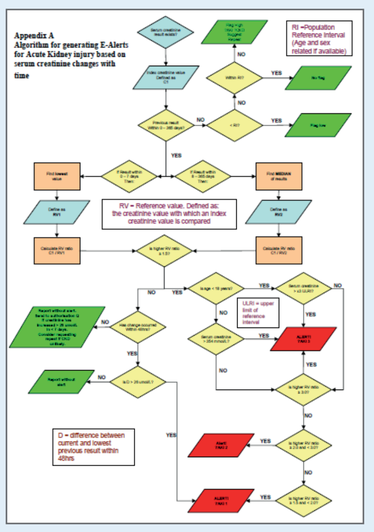

Introduction

Tackling the harm associated with Acute Kidney Injury (AKI) is a global priority. In England, a national computerised AKI algorithm is being introduced across the NHS to drive this change. The study sought to maximise its clinical utility and minimise the potential for burden on both clinicians and patients in primary care.

Methods

Design

An appropriateness ratings evaluation using the RAND/UCLA Appropriateness Method.1 It is a systematic approach to address specific dilemmas in clinical practice in which clinical decisions are required but where 'robust scientific evidence' about the benefits is lacking.

Setting

Clinical scenarios were developed to test the timeliness in a) communication of AKI Warning Stage Test Results from clinical pathology services to primary care, and b) primary care clinician response to an AKI Warning Stage Test Result.

Panel membership and rating

A 10-person panel was purposively sampled with representation from clinical biochemistry, acute and emergency medicine and routine general practice. General practitioners represented typical practice in relation to rural and urban practice, out of hours care, GP commissioning and those interested in reducing 'over-diagnosis.'

The RAND/UCLA study entailed two rounds of rating. Round two entailed a one day face-to-face meeting held in September, 2015. Following discussion of round one ratings, panel members then rated each scenario on their own individual blinded rating sheets. Panel members were not required to reach consensus.

Data entry and analysis

Agreement was defined by 8 out the 10 (80%) panel members rating the same 3-point region on the 9 point integer scale (i.e. 1-3; 4-6, 7-9). Disagreement was defined to exist where ≥30% of panel members rated a scenario in the 1-3 range and where ≥30% rated the same scenario in the 7-9 range on the 9-point integer scale. A proposed action was then categorised as an 'appropriate' next step if a scenario rated 7-9 without disagreement and a rating of 1-3 without disagreement was deemed to be an 'inappropriate' next step. Ratings of clinical scenarios without consensus (either 'agreement' or 'disagreement') were considered as equivocal.

Results

There was agreement that delivery of AKI Warning Stage Test Results through interruptive methods of communication (i.e. telephone) from laboratories to primary care was the appropriate next step for patients with an AKI Warning Stage 3 Test Result.

Table 2: Communication of AKI Warning Stage Test Results for Adults by Clinical Pathology Services to Primary Care

	AKI Warning Stage 1			AKI Warning Stage 2			AKI Warning Stage 3		
	Response	Result	Median	Response	Result	Median	Response	Result	Median
Potassium not raised	Non-IC & No C	E	5	Non-IC & No C	A	1	Non-IC & No C	A	1
	Non-IC & C	U	7	Non-IC & C	U	5.5	Non-IC & C	A	2
	Non-IC &M	E	5	Non-IC &M	E	6	Non-IC &M	A	2
	IC (Telephone)	E	5	IC (Telephone)	E	7	IC (Telephone)	A	9
Mild hyperkalaemia (5.5-5.9 mmol/l)	Non-IC & No C	A	3	Non-IC & No C	A	1	Non-IC & No C	A	1
	Non-IC & C	D	7	Non-IC & C	E	3	Non-IC & C	A	1
	Non-IC &M	E	5	Non-IC &M	E	7	Non-IC &M	A	1.5
	IC (Telephone)	E	5	IC (Telephone)	A	8	IC (Telephone)	A	9
Moderate hyperkalaemia (6.0-6.4 mmol/l)	Non-IC & No C	A	1	Non-IC & No C	A	1	Non-IC & No C	A	1
	Non-IC & C	E	3.5	Non-IC & C	A	2	Non-IC & C	A	1
	Non-IC &M	E	5.5	Non-IC &M	E	6	Non-IC &M	A	1
	IC (Telephone)	A	9	IC (Telephone)	A	9	IC (Telephone)	A	9

Colour key: RED: Agreement for interruptive communication as an appropriate action, WHITE: No agreement on an appropriate action. Abbreviations: A=Agreement, IC = interruptive communication, C = comment, D=Disagreement, E=Equivocal, M = email, U=agreement with uncertain benefit.

In the context of acute illness, waiting up to 72 hours to respond to an AKI Warning Stage Test Result was deemed an inappropriate action in 62 out of the 65 (94.5%) UCLA/RAND clinical cases tested.

There was agreement that a clinician response was required within 6 hours, or less, in 39 out of 40 (97.5%) clinical cases relating AKI Warning Stage Test Results in the presence of moderate hyperkalaemia (K+ 6.0-6.4 mmol/l).

Table 3: Timeliness in Response to AKI Warning Stage Test Results for Adults in Primary Care – In the context of acute illness

Acute Kidney Injury (AKI) in the context of acute illness	AKI Warning Stage 1				AKI Warning Stage 2				AKI Warning Stage 3			
	No co-morbidities	Chronic heart failure	CKD 4/5 or renal transplant	CKD 4/5 & chronic heart failure	No co-morbidities	Chronic heart failure	CKD 4/5 or renal transplant	CKD 4/5 & chronic heart failure	No co-morbidities	Chronic heart failure	CKD 4/5 or renal transplant	CKD 4/5 & chronic heart failure
Potassium not raised	SIA = A(2) < 6 = D(5.5) <24= E(7) <72= E(5)	SIA = E(3) < 6 = D(6) <24= A(7) <72=E(2.5)	SIA = E(4.5) < 6 = U(7) <24=A(7.5) <72= A(1)	SIA = E(4.5) < 6 = U(7) <24= E(5.5) <72=A(1)	SIA = E(4.5) < 6 = A(7) <24= E(7) <72= A(1)	SIA = E(5) < 6 = U(7.5) <24= U(6) <72=A(1)	SIA = E(5) < 6 = A(7) <24= D(5.5) <72= A(1)	SIA = E(7) < 6 = A(8) <24= E(4) <72=A(1)	SIA =A (8) < 6 =U(7) <24=A(1) <72=A(1)	Not Tested	Not Tested	Not Tested
Mild hyperkalaemia (5.5 to 5.9mmol/l)	SIA = E(3.5) < 6 = E(7) <24= A(7) <72= E(3)	SIA = E(4.5) < 6 = U(7) <24=U(6.5) <72=A(1.5)	SIA = E(5) < 6 = A(7.5) <24= E(6) <72= A(1)	SIA =U(5.5) < 6 = A(7) <24= E(4) <72=A(1)	SIA = E(5) < 6 = A(8) <24= U(7) <72= A(1)	SIA = U(6) < 6 = A(7.5) <24= E(5.5) <72=A(1)	SIA = U(6) < 6 = A(8) <24= E(3) <72= A(1)	SIA = A(7) < 6 = A(7) <24= U(3) <72=A(1)	Not Tested	Not Tested	Not Tested	Not Tested
Moderate hyperkalaemia (6.0 to 6.4 mmol/l)	SIA = E(6) < 6 = A(8) <24= E(5) <72= A(1)	SIA =D(5.5) < 6 = A(7) <24= E(5) <72=A(1)	SIA = E(7) < 6 = A(7.5) <24= E(2.5) <72= A(1)	SIA = A(8) < 6 =U(6.5) <24= A(2) <72=A(1)	SIA = A(7.5) < 6 = E(8) <24= A(3) <72= A(1)	SIA = A(7) < 6 = A(8) <24= U(3) <72=A(1)	SIA = A(7.5) < 6 = U(7) <24= A(3) <72= A(1)	SIA = A(8) < 6 = U(7) <24= A(2) <72=A(1)	Not Tested	Not Tested	Not Tested	Not Tested
Risk of urinary tract obstruction or intrinsic renal disease	SIA = E(7) < 6 = A(7.5) <24= E(5) <72= A(1)	SIA = E(6.5) < 6 = E(6.5) <24= D(7) <72= A(1)	SIA = E(7.5) < 6 = E(6) <72= A(1)	SIA = A(8) < 6 = E(7) <24= E(2) <72=A(1)	SIA = A(7) < 6 = E(7) <24= E(4.5) <72= A(1)	SIA = E(7) < 6 = U(7) <24= E(6) <72=A(1)	SIA = U(7) < 6 = E(7) <24= A(3) <72= A(1)	SIA = A(7.5) < 6 = E(7) <24= A(2) <72=A(1)	Not Tested	Not Tested	Not Tested	Not Tested
Poor oral intake/urine output	SIA = E(4) < 6 = A(7) <24= E(7) <72= A(1.5)	SIA = E(4) < 6 = U(7) <24= E(7) <72=A(2)	SIA = E(4.5) < 6 = A(7) <24= U(7) <72=A(1.5)	SIA = E(6) < 6 = U(7) <24= E(5) <72=A(1)	SIA = U(7) < 6 = A(7) <24= E(4) <72= A(1)	SIA = E(6) < 6 = A(7) <24= E(5.5) <72=A(1)	SIA = U(6) < 6 = A(8) <24= U(3) <72= A(1)	SIA = U(7) < 6 = A(8) <24= E(3.5) <72=A(1)	Not Tested	Not Tested	Not Tested	Not Tested
Mild hyperkalaemia + poor oral intake/urine output	SIA = U(5) < 6 = A(7) <24= D(6) <72= A(1)	SIA = U(5) < 6 = E(7) <24= E(7) <72=A(1)	SIA = U(6) < 6 = A(7) <24= D(5) <72= A(1)	SIA U(6.5) < 6 = U(7) <24= A(2) <72=A(1)	SIA = U(7) < 6 = A(8) <24= E(4.5 <72= A(1)	SIA = E(6.5) < 6 = A(8) <24= U(3.5) <72=A(1)	SIA = U(7) < 6 = A(8) <24= E(3) <72= A(1)	SIA = A(7) < 6 = A(8) <24= A(2) <72=A(1)	Not Tested	Not Tested	Not Tested	Not Tested
Moderate hyperkalaemia + poor oral intake/urine output	SIA = A(7) < 6 = A(8) <24= A(2.5) <72= A(1)	SIA = E(7) < 6 = E(7) <24= E(3) <72=A(1)	SIA = A(8) < 6 = E(7) <24= E(3) <72= A(1)	SIA = A(9) < 6 =D(5.5) <24= A(2) <72=A(1)	SIA = A(9) < 6 = U(7) <24= A(2.5) <72= A(1)	SIA = A(8) < 6 = U(7) <24= A(2.5) <72=A(1)	SIA = A(8.5) < 6 = E(6.5) <24= A(2) <72= A(1)	SIA = A(9) < 6 = E(6.5) <24= A(1.5) <72=A(1)	Not Tested	Not Tested	Not Tested	Not Tested
Risk urinary tract obstruction or Intrinsic renal disease + poor oral intake/ urine output	SIA = E(7.5) < 6 = E(7.5) <24= E(3) <72= A(1)	SIA = E(6.5) < 6 = E(5.5) <24=D(3.5) <72=A(1)	SIA = E(7.5) < 6 = E(6.5) <24=D(1.5) <72= A(1)	SIA = A(8) < 6 = A(7) <24= A(2) <72= A(1)	SIA = E(8) < 6 = E(6.5) <24= E(3) <72= A(1)	SIA = A(7.5) < 6 = E(6.5) <24= E(3) <72=A(1)	SIA = A(8) < 6 = E(7) <24= A(2) <72= A(1)	SIA = A(8) < 6 = E(7) <24=A(2) <72=A(1)	Not Tested	Not Tested	Not Tested	Not Tested

Colour key: RED: Agreement that seeking immediate admission is an appropriate action, ORANGE: Agreement that responding in less than 6 hours is an appropriate action, BROWN: Agreement that responding in less than 24 hours is an appropriate action, WHITE: No agreement on an appropriate action. Numerical value in brackets: median rating
Abbreviations: A=Agreement, CKD 4/5= Chronic Kidney Disease stage 4 or 5, D=Disagreement, E=Equivocal, SIA=Seek immediate admission, U=agreement with uncertain benefit.

Table 4: Timeliness in Response to AKI Warning Stage Test Results for Adults in Primary Care – No acute illness

Acute Kidney Injury (AKI) with no history of acute illness	AKI Warning Stage 1				AKI Warning Stage 2				AKI Warning Stage 3			
	No co-morbidities	Chronic heart failure	CKD 4/5 or Renal Transplant	CKD 4/5 & chronic heart failure	No co-morbidities	Chronic heart failure	CKD 4/5 or Renal Transplant	CKD 4/5 & chronic heart failure	No co-morbidities	Chronic heart failure	CKD 4/5 or Renal Transplant	CKD 4/5 & chronic heart failure
Potassium not raised	SIA = A(1) < 6 = A(1) <24= E(6.5) <72= E(7.5)	SIA = A(1) < 6 = E(4) <24= A(7) <72= E(7)	SIA = A(1) < 6 = E(4.5) <24= A(8) <72= E(4.5)	SIA = A(1) < 6 = E(5) <24= A(8) <72= E(5)	SIA = E(1.5) < 6 = E(6.5) <24= E(6) <72= E(1.5)	SIA = E(2.5) < 6 = E(7) <24= U(7) <72= A(1)	SIA = E(5.5) < 6 = E(7) <24= D(6) <72= A(1)	SIA = D(5) < 6 = U(7) <24= E(5) <72= A(1)	SIA = E(7) < 6 = A(7.5) <24= E(2.5) <72= A(1)	SIA = U(7) < 6 = A(8) <24= E(4) <72= A(1)	SIA = A(7) < 6 = U(7) <24= A(1.5) <72= A(1)	SIA = A(8) < 6 = E(6.5) <24= A(1) <72= A(1)
Mild hyperkalaemia (5.5 to 5.9mmol/l)	SIA = A(1) <6 = E(3.5) <24= A(8) <72= E(6)	SIA = A(1) < 6 = E(5) <24= A(8) <72= D(3)	SIA = A(1.5) < 6 = E(5) <24= A(8) <72= E(1)	SIA = A(1) < 6 = D(5.5) <24= A(8) <72= A(1)	SIA = E(2.5) < 6 = E(6.5) <24= E(7) <72= E(2.5)	SIA = E(2.5) < 6 = U(7) <24= E(7) <72= A(1)	SIA = D(5.5) < 6 = U(7) <24= D(5.5) <72= A(1)	SIA = D(5.5) < 6 = A(7.5) <24= D(5.5) <72= A(1)	SIA = U(7) < 6 = A(7.5) <24= E(1.5) <72= A(1)	SIA = A(7) < 6 = A(7.5) <72= A(1)	SIA = A(8) < 6 = E(7) <24= A(1.5) <72= A(1)	SIA = A(8) < 6 = E(7.5) <24= A(1) <72= A(1)
Moderate hyperkalaemia (6.0 to 6.4 mmol/l)	SIA = E(3) <6 = A(7) <24= E(7) <72= A(1.5)	SIA = E(3.5) < 6 = A(7) <24= E(6) <72= A(1)	SIA = E(6) < 6 = A(8) <24= D(5.5) <72= A(1)	SIA = E(6) < 6 = A(7.5) <24= D(5.5) <72= A(1)	SIA = E(4) < 6 = A(8) <24= D(6) <72= A(1)	SIA = E(5.5) < 6 = A(8) <24= E(6) <72= A(1)	SIA = E(6.5) < 6 = A(8) <24= E(3.5) <72= A(1)	SIA = A(8) < 6 = A(8) <24= E(3) <72= A(1)	SIA = A(8) < 6 = A(7.5) <24= A(1.5) <72= A(1)	SIA = A(8) < 6 = A(7.5) <24= A(1.5) <72= A(1)	SIA = A(9) < 6 = E(6) <24= A(1) <72= A(1)	SIA = A(9) < 6 = D(4.5) <24= A(1) <72= A(1)
Recent increase diuretics/ACEI + Potassium not raised	SIA = A(1) <6 = A(2) <24= A(8) <72= U(6)	SIA = A(1) < 6 = E(3.5) <24= U(6.5) <72= D(6)	SIA = A(2) < 6 = U(5.5) <24= A(8) <72= E(3)	SIA = A(2.5) < 6 = E(5) <24= A(8) <72= A(2.5)	SIA = E(3) < 6 = E(7) <24= E(7) <72= E(1)	SIA = E(3) < 6 = U(7) <24= U(7.5) <72= E(1)	SIA = U(3) < 6 = U(7) <24= E(6.5) <72= A(1)	SIA = U(4) < 6 = A(7) <24= D(5.5) <72= A(1)	SIA = E(7) < 6 = A(7.5) <24= E(2) <72= A(1)	SIA = A(7) < 6 = A(7) <24= E(3) <72= A(1)	SIA = A(7) < 6 = E(7) <24= E(1) <72= A(1)	SIA = A(7.5) < 6 = U(7.5) <24= A(1.5) <72= A(1)
Recent increase diuretics/ACEI + Mild Hyperkalaemia	SIA = A(1.5) <6 = E(4) <24= A(8) <72= E(5.5)	SIA = A(1.5) < 6 = E(5) <24= A(8) <72= A(2.5)	SIA = A(2.5) < 6 = E(7) <24= A(7.5) <72= A(2)	SIA = E(3) < 6 = E(6) <24= A(8) <72= A(2)	SIA = A(3) < 6 = U(7) <24= E(6.5) <72= A(1.5)	SIA = E(3) < 6 = U(7) <24= E(6.5) <72= E(1.5)	SIA = U(4) < 6 = A(7) <24= E(5.5) <72= A(1)	SIA = U(5) < 6 = A(8) <24= D(4) <72= A(1)	SIA = A(7) < 6 =A (7.5) <24= E(2) <72= A(1)	SIA = A(7) < 6 = A(7) <24= E(1.5) <72= A(1)	SIA = A(7) < 6 = E(7.5) <24= A(1) <72= A(1)	SIA = A(7.5) < 6 = U(7.5) <24= A(1.5) <72= A(1)
Recent increase diuretics/ACEI + Moderate hyperkalaemia	SIA = E(3) <6 = A(7) <24= E(7) <72= A(1)	SIA = U(4) <6 = A(7.5) <24= D(6.5) <72= A(1)	SIA = U(5.5) <6 = A(8) <24= D(6.5) <72= A(1)	SIA = E(6) < 6 = A(7) <24= D(5) <72= A(1)	SIA = E(3.5) < 6 = A(8) <24= D(6) <72= A(1)	SIA = E(6.5) < 6 = A(8) <24= E(6) <72= A 1)	SIA = U(7) < 6 = A(8) <24= E(3.5) <72= A(1)	SIA = A(7) < 6 = A(7.5) <24= U(4) <72= A(1)	SIA = A(8) < 6 = U(7.5) <24= A(1.5) <72= A(1)	SIA = A(8) < 6 = E(7) <24= A(1) <72= A(1)	SIA = A(8.5) < 6 = E(7) <24= A(1) <72= A(1)	SIA = A(8) < 6 = E(7) <24= A(1) <72= A(1)

Colour key: RED: Agreement that seeking immediate admission is an appropriate action, ORANGE: Agreement that responding in less than 6 hours is an appropriate action, BROWN: Agreement that responding in less than 24 hours is an appropriate action, WHITE: No agreement on an appropriate action. Numerical value in brackets: Median rating. Abbreviations: ACEi=Angiotensin Converting Enzyme inhibitor, A=Agreement, CKD 4/5= Chronic Kidney Disease stage 4 or 5, D=Disagreement, E=Equivocal, SIA=Seek immediate admission, U=agreement with uncertain benefit.

Discussion

In a context where clinical workload in English general practice is reaching saturation point, there is a need to maximise its clinical utility and minimise the potential for burden on both clinicians and patients. The study sought to address this challenge and the findings have informed the development of guidance to support a timely and calibrated response to AKI Warning Stage Test Results for adults in primary care.

https://www.thinkkidneys.nhs.uk/aki/resources/primary-care/ Further research is needed to support effective implementation, with a view to examining their effect on health outcomes and costs.

References

Fitch K BS, Aguilar MD, Burnand B, et al. The RAND/UCLA Appropriateness Method User's Manual. Santa Monica: RAND, 2001

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www.thinkkidneys.nhs.uk