



Adding Insult to Injury

A review of the care of patients who died in hospital with a primary diagnosis of acute kidney injury (acute renal failure).

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SUMMARY

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Introduction

Acute kidney injury (AKI), formerly known as acute renal failure, is both a prevalent and serious problem amongst hospitalised patients. Although no definitive studies have been undertaken in the UK the prevalence amongst hospitalised patients in the US is 4.9%¹. Associated mortality rates have been wide ranging². Clinically, AKI should be easily recognised by the onset of oliguria, anuria and/or deteriorating biochemistry. However, if unrecognised and allowed to deteriorate, AKI will result in uraemia, acidosis, hyperkalaemia and ultimately death.

Strategies to reduce the risk of AKI are well known; they include identifying relevant risk factors, appropriate monitoring of blood biochemistry, rapid remedial action when AKI occurs, and appropriate referral of patients to specialist services. However, it is unknown if these strategies are being implemented and many factors around patients with AKI, both amongst those admitted to and already within UK hospitals remain unclear.

Despite the seriousness of this condition, and its potential for treatment if detected early, it lacks a standard definition, and historically its treatment has been a matter of debate amongst clinicians. Recently, attempts have been made to classify AKI, as a set of functional criteria which give perspective on the degree of injury. To this end the RIFLE classification (risk, injury, failure, loss of kidney function, end-stage kidney disease) was devised and then further refined by the Acute Kidney Injury Network.

All hospital patients, regardless of specialty, are at risk of AKI either through their presenting illness or subsequent iatrogenic injury. However, it is unknown whether potential deficiencies in the care of patients with AKI are predominantly due to clinical failure (risk assessment, recognition, and management); or whether organisational issues such as a lack of availability of expert advice and intensive support are equally culpable. In addition, there exist treatments for AKI which are the result of historical dogma rather than evidence based therapeutics (e.g. diuretics/dopamine) and it is unclear to what extent these are still practised.

The aim of this study was to look in detail at these issues allowing NCEPOD to provide recommendations for the future care of patients with AKI.

Principal recommendations

All patients admitted as an emergency, regardless of specialty, should have their electrolytes checked routinely on admission and appropriately thereafter. This will prevent the insidious and unrecognised onset of AKI. (Clinical Directors and Medical Directors)

Predictable and avoidable AKI should never occur. For those in-patients who develop AKI there should be both a robust assessment of contributory risk factors and an awareness of the possible complications that may arise. (Clinical Directors and Medical Directors)

All acute admissions should receive adequate senior reviews (with a consultant review within 12 hours of admission as previously recommended by NCEPOD³). (Clinical Directors and Medical Directors)

NCEPOD recommends that the guidance for recognising the acutely ill patient (NICE CG 50) is disseminated and implemented. In particular all acute patients should have admission physiological observations performed and a written physiological monitoring plan made, taking into account the degree of illness and risk of deterioration. (Clinical Directors and Medical Directors)

There should be sufficient critical care and renal beds to allow rapid step up in care if appropriate. (Department of Health)

All level 3 units should have the ability to deliver renal replacement therapy; and where appropriate these patients should receive clinical input from a nephrologist. (Clinical Directors and Medical Directors)

All acute admitting hospitals should have access to either onsite nephrologists or a dedicated nephrology service within reasonable distance of the admitting hospital. (Clinical Directors and Medical Directors)

All acute admitting hospitals should have access to a renal ultrasound scanning service 24 hours a day including the weekends and the ability to provide emergency relief of renal obstruction. (Clinical Directors and Medical Directors)

1 - Method

Study aim

The primary aim of this study was to examine the process of care of patients who died in hospital with acute kidney injury (AKI), in order to identify remediable factors in the care received by these patients.

Objectives

The expert group identified seven main thematic areas that would address the overall aim of the study and these will be addressed throughout the following chapters:

- Diagnosis and recognition of AKI
- Recognition of risk factors associated with AKI
- Prevention of AKI
- Assessment of patients recognised as being in AKI
- Management of established AKI
- Recognition and management of complications of AKI
- Organisational factors relevant to the treatment of AKI

Hospital participation

National Health Service hospitals in England, Wales and Northern Ireland were expected to participate, as well as hospitals in the independent sector and public hospitals in the Isle of Man, Guernsey and Jersey.

Study population

Patients aged 16 years or older were eligible for inclusion if they were coded for a diagnosis of AKI and subsequently died in hospital between January 1st 2007 and March 31st 2007 inclusive.

Exclusion criteria

The following patient groups were excluded:

- Patients already on renal replacement therapy (RRT)
- Patients whose admission was, at the outset, for palliative care.

Questionnaires and casenotes

There were two questionnaires used to collect data for this study, one clinical questionnaire per patient and one organisational questionnaire per hospital.

1. Clinical Questionnaire

This questionnaire was sent to the consultant caring for the patient at the time of death.

2. Organisational questionnaire

This questionnaire concerned data on the staff, facilities and protocols, relevant to the management of AKI, for each participating hospital.

3. Casenotes

For each case to be peer reviewed selected photocopies of casenote extracts were requested.

Advisor group

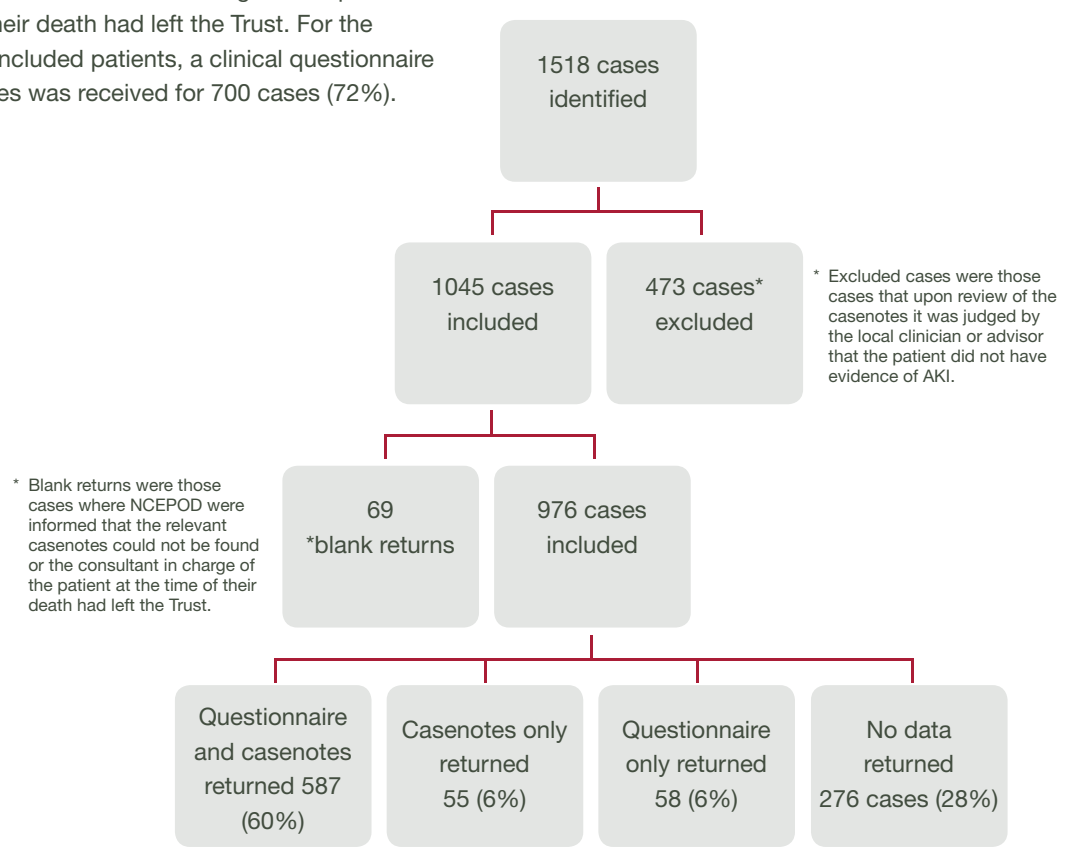
After being anonymised each case was reviewed by one advisor within a multidisciplinary group. At regular intervals throughout the meeting, the chair allowed a period of discussion for each advisor to summarise their cases and ask for opinions from other specialties or raise aspects of a case for discussion.

2 - Data returns

Clinical questionnaire returns

1518 patients from 215 hospitals were identified as meeting the inclusion criteria for the study. Four hundred and seventy three cases were subsequently excluded from the study for either not being indicative of AKI, or because the admission, at the outset, was for palliative care. For a further 69 cases the casenotes were reported as being lost or the consultant in charge of the patient at the time of their death had left the Trust. For the remaining 976 included patients, a clinical questionnaire and/or casenotes was received for 700 cases (72%).

Figure 2.1 Data returns



3 - Overall quality of care

The following grading system was used by the advisors to grade the overall care each patient received.

Good practice: A standard that you would accept from yourself, your trainees and your institution.

Room for improvement: Aspects of clinical care that could have been better.

Room for improvement: Aspects of organisational care that could have been better.

Room for improvement: Aspects of both clinical and organisational care that could have been better.

Less than satisfactory: Several aspects of clinical and/or organisational care that were well below that you would accept from yourself, your trainees and your institution.

Insufficient information submitted to NCEPOD to assess the quality of care.

Overall quality of care

The advisors were asked to comment on the overall quality of clinical care received by the patients in the study (Figure 3.1). As can be seen only 50% of patients were considered to have received an overall standard of care that was considered good. The majority of patients who received less than good care were more often judged to have room for improvement in clinical rather than organisational care; suggesting deficiencies in AKI care are primarily related to the clinicians managing those patients and not deficiencies in process or material. This may indicate a lack of awareness of the inherent risk of AKI amongst hospitalised patients; a poor understanding of the pathophysiology of the condition; or inadequate knowledge of its management amongst medical staff. It is likely this reflects deficiencies in training, both at undergraduate and postgraduate level, which is of particular note considering the prevalence and clinical importance of AKI.

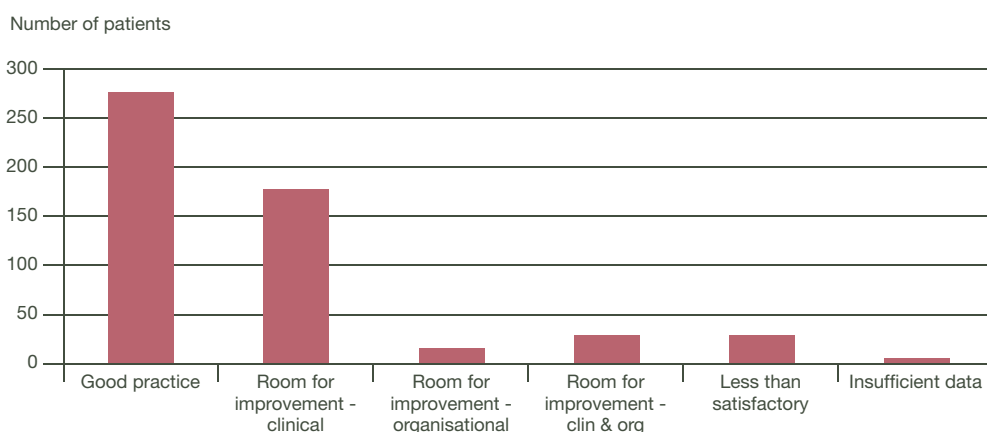


Figure 3.1 Overall assessment of care – advisors’ opinion

When the overall quality of care within the study group was further broken down into those who developed AKI pre- and post-admission it can be seen that there was far more evidence of less than good practice in the post-admission AKI patients (Figure 3.2); with only a third (34/107) receiving good care as judged by the advisors.

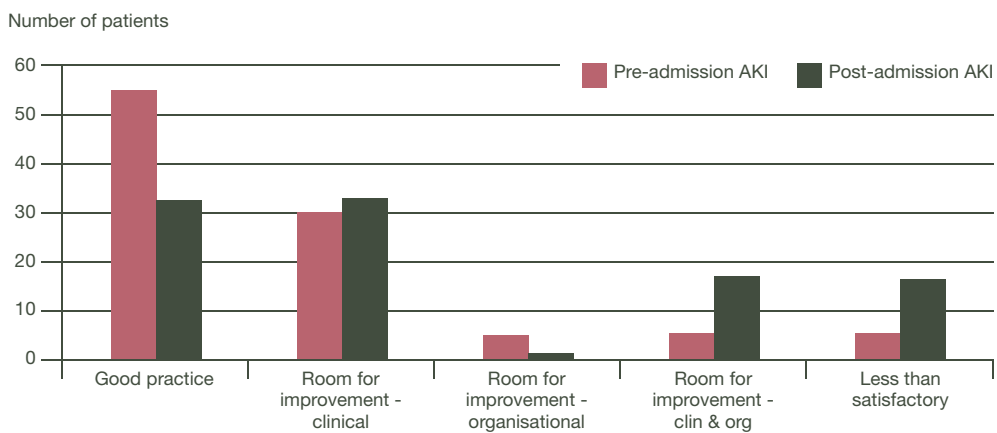


Figure 3.2 Overall assessment of care (pre-admission vs post-admission AKI)

n = 457 and 107 for pre- and post-admission AKI respectively

4 - Key findings and recommendations

Admission and assessment of acute kidney injury

Key Findings

Only 50% (280/564) of AKI care was considered good by the advisors.

There was poor assessment of risk factors for AKI; both in the assessment of patients in established AKI and those who subsequently developed it.

The advisors judged there to be an unacceptable delay in recognising post-admission AKI in 43% (42/98) of patients.

A fifth (22/107) of post-admission AKI was both predictable and avoidable in the view of the advisors.

In the advisors' opinion complications of AKI were missed in 13% of cases (55/436), avoidable in 17% (74/431) and managed badly in 22% (94/428) of cases.

Recommendations

Initial clerking of all emergency patients should include a risk assessment for AKI. (Clinical Directors and Medical Directors)

All patients admitted as an emergency, regardless of specialty, should have their electrolytes checked routinely on admission and appropriately thereafter. This will prevent the insidious and unrecognised onset of AKI. (Clinical Directors and Medical Directors)

Predictable and avoidable AKI should never occur. For those in-patients who develop AKI there should be both a robust assessment of contributory risk factors and an awareness of the possible complications that may arise. (Clinical Directors and Medical Directors)

Undergraduate medical training should include the recognition of the sick patient and the prevention, diagnosis and management of AKI. (Deaneries)

Postgraduate training for all specialties should include awareness, causes, recognition, management and complications of AKI. (Deaneries)

Investigation and management of acute kidney injury

Key Findings

178/540 (33%) patients had inadequate investigations. The omissions were basic clinical examination and simple laboratory tests.

63 patients with AKI did not have urinalysis performed.

154/529 (29%) patients had inadequacies in clinical management of AKI. Lack of physiological monitoring was common.

Recognition of acute illness, hypovolaemia and sepsis was poor.

Recommendations

Reagent strip urinalysis should be performed on all emergency admissions. (Clinical Directors and Medical Directors)

NCEPOD recommends that the guidance for recognising the acutely ill patient (NICE CG 50) is disseminated and implemented. In particular all acute patients should have admission physiological observations performed and a written physiological monitoring plan made, taking into account the degree of illness and risk of deterioration. (Clinical Directors and Medical Directors)

Trusts need to put in place a mechanism to ensure that NICE guidance (CG 50) has been implemented. An audit of patients who suffer serious adverse events (cardiac arrest or unplanned admission to critical care) to assess compliance with NICE CG 50 should be presented to the Trust Clinical Governance Committee on an annual basis. (Clinical Directors and Medical Directors)

Referral and support

Key Findings

173/561 (31%) patients were referred to a nephrologist for advice or management support.

35/167 (21%) referrals to nephrology were considered by the advisors to be delayed.

77/379 (20%) patients who were not referred to a nephrologist, should have been referred for advice and support in the view of the advisors.

The advisors judged quality of care to be good in 69% of patients who were referred to nephrologists in a timely manner and in whom the advice given was appropriate (111 patients).

Recommendations

When referral is made for specialist advice from nephrologists prompt senior advice and a review where appropriate is required. All patients with AKI should be promptly discussed by the renal registrar with their consultants. (Clinical Directors and Medical Directors)

Every hospital should have a written guideline detailing how the three clinical areas where patients with AKI are treated (critical care unit, the renal unit and the non-specialist ward) interact to ensure delivery of high quality, clinically appropriate care for patients with AKI. (Clinical Directors and Medical Directors)

Renal replacement therapy

Key Findings

Only 67/551 (12%) patients received RRT.

Of the 427 patients who did not receive RRT the advisors judged that 36 (8%) should have received RRT as part of their treatment plan.

Older patients received less RRT in this study. Above the age of 85 very few patients received RRT.

Treatment limitations were made in 52% of patients in this study. Patient involvement was low.

Recommendations

Early recognition of at risk patients should allow patient involvement in treatment limitation decisions before clinical condition deteriorates and the opportunity for this involvement is missed. (Clinical Directors and Medical Directors)

Treatment limitation decisions should be made with reference to guidance produced by the GMC and within the legislative framework of the Mental Capacity Act. (Clinical Directors and Medical Directors)

Recognition of severity of illness

Key Findings

134/549 patients did not have adequate senior reviews. These patients were judged by the advisors to have less good care overall.

Critical care outreach services were involved in 79/537 cases. It was believed, by the advisors, that they should have been involved in a further 106 cases.

113 patients were transferred to renal/critical care. The advisors were of the view that an additional 44 should have received step up care.

Patients who did not receive appropriate step up care were judged by the advisors to have an overall quality of care that was poor.

Recommendations

All acute admissions should receive adequate senior reviews (with a consultant review within 12 hours of admission as previously recommended by NCEPOD³. (Clinical Directors and Medical Directors)

There should be sufficient critical care and renal beds to allow rapid step up in care if appropriate. (Department of Health)

Organisation of renal services

Key Findings

More than half of acute admitting hospitals did not have onsite nephrologists (118/217: 54%).

For 61/155 (39%) of all hospitals without nephrologists, the nearest nephrologist was in a different city.

Not all hospitals have access to ultrasound scanning of the renal tract out of hours or at the weekend.

Only 177/297 (60%) of all hospitals were able to provide a nephrostomy service out of hours during the week. This figure was similar for the weekend (170/291: 58%)

Only a small proportion of hospitals providing RRT in level 2/3 units had input from a nephrologist.

Recommendations

All acute admitting hospitals should have access to either onsite nephrologists or a dedicated nephrology service within reasonable distance of the admitting hospital. (Clinical Directors and Medical Directors)

All acute admitting hospitals should have access to a renal ultrasound scanning service 24 hours a day including the weekends and the ability to provide emergency relief of renal obstruction. (Clinical Directors and Medical Directors)

All level 3 units should have the ability to deliver renal replacement therapy; and where appropriate these patients should receive clinical input from a nephrologist. (Clinical Directors and Medical Directors)

References

1. Naikar SS, Liu KD, Chertow GM. The incidence and prognostic significance of acute kidney injury. *Cherow 2007. Curr Opin Nep Nephrol Hypertens*; 16:227-236.
2. Hoste EA, Clermont G, Kersten A, et al. RIFLE criteria for acute kidney injury are associated with hospital mortality in critically ill patients: a cohort analysis. 2006. *Crit Care*. 10(3):R73.
3. Emergency Admissions: A journey in the right direction? 2007. National Confidential Enquiry into Patient Outcome and Death. London. <http://www.ncepod.org.uk/reports.htm>
4. Dwinell BG and Anderson RJ. Diagnostic Evaluation of the Patient with Acute Renal Failure, Chapter 12. http://www.kidneyatlas.org/book1/adk1_12.pdf
5. Bion JF and Heffner JE. Challenges in the care of the acutely ill. 2004. *Lancet* 363:970-977.
6. Franklin C and Mathew J. Developing strategies to prevent in-hospital cardiac arrest: analyzing responses of physicians and nurses in the hours before the event. 1994. *Crit Care Med* 22:244-247.
7. McQuillan P, Pilkington S, Allan A, et al. Confidential inquiry into quality of care before admission to intensive care. 1998. *BMJ* 316:1853-1858.
8. An Acute Problem. 2005. National Confidential Enquiry into Patient Outcome and Death. <http://www.ncepod.org.uk/2005report/>
9. Stevens PE, Tamimi NA, Al Hasani MK, et al. Non-specialist management of acute renal failure. 2001. *QJM* 94: 533-540.
10. Vijayan A and Miller SB. Acute renal failure: prevention and nondialytic therapy. 1998. *Semin Nephrol* 18:523-532.
11. Davidman M, Olson P, Kohen J, et al. Iatrogenic renal disease. 1991. *Arch Intern Med* 151:1809-1812.
12. The Renal Association. 2008. Clinical Practice Guideline 10.3-AKI: Nutritional Support.
13. Uchino, S, Doig, GS, Bellomo, R, et al. Diuretics and mortality in acute renal failure. 2004. *Crit Care Med* 32:1669-1677.
14. Kellum, JA and Decker, JM Use of dopamine in acute renal failure: a meta-analysis. 2001. *Crit Care Med* 29:1526-1531.
15. Marik, PE. Low-dose dopamine: a systematic review. 2002. *Intensive Care Med*. 28:877-883.
16. Friedrich, JO, Adhikari, N, Herridge, MS, et al. Meta-analysis: low-dose dopamine increases urine output but does not prevent renal dysfunction or death. 2005. *Ann Intern Med* 142:510-524.
17. Bellomo, R, Chapman, M, Finfer, S, et al. Low-dose dopamine in patients with early renal dysfunction: a placebo-controlled randomised trial. 2000. Australian and New Zealand Intensive Care Society (ANZICS) Clinical Trials Group. *Lancet* 356:2139-2143.

REFERENCES

18. Khan IH, Catto GR, Edward N, et al. Acute renal failure: factors influencing nephrology referral and outcome. 1997. QJM. 90(12):781-5.
19. The National Service Framework for Renal Services- Part Two: Chronic Kidney Disease, Acute Renal Failure and End of Life Care. 2005. Department of Health.
20. Feest TG, Mistry CD, Grimes DS, et al. Incidence of advanced chronic kidney disease and the need for end stage renal replacement therapy. 1990. BMJ 301:897-900.
21. Khan IH, Catto GRD, Edward N, et al. Chronic kidney disease: factors influencing nephrology referral. 1994. QJ M 87:559-64.
22. Parry R G, Crowe A, Stevens J M, et al. Referral of elderly patients with severe renal failure: questionnaire survey of physicians. 1996. BMJ 313:466.
23. Pannu N, Klarenbach S, Wiebe N, et al. Renal replacement therapy in patients with acute renal failure: a systematic review. 2008. JAMA. 299(7):793-805.
24. Rabindranath K, Adams J, Macleod AM, et al. Intermittent versus continuous renal replacement therapy for acute renal failure in adults. 2007. Cochrane Database Syst Rev. 18;(3):CD003773.
25. Withholding and Withdrawing Life-prolonging Treatments: Good Practice in Decision-making. 2002. General Medical Council.
26. <http://www.dh.gov.uk/en/SocialCare/Deliveringadultsocialcare/MentalCapacity/IMCA/index.htm>.
27. McQuillan P, Pilkington S, Allan A et al. Confidential inquiry into quality of care before admission to intensive care. 1998. BMJ 316:1853-1858.
28. McGloin H, Adam SK and Singer M. Unexpected deaths and referrals to intensive care of patients on general wards. Are some cases potentially avoidable? 1999. J R Coll Physicians Lond 33(3):255-259.
29. Seward E, Greig E, Preston S, et al. A confidential study of deaths after emergency medical admission: issues relating to quality of care. 2003. Clin Med 3(5):425-434.
30. Franklin C, Mathew J. Developing strategies to prevent in-hospital cardiac arrest: analyzing responses of physicians and nurses in the hours before the event. 1994. Crit Care Med 22(2):244-247.
31. Schein RM, Hazday N, Pena M, et al. Clinical antecedents to in-hospital cardiopulmonary arrest. 1990. Chest 98(6):1388-1392.

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