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Acute Kidney Injury: It's as easy as ABCDE

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Abstract

Acute kidney injury (AKI) is a common, serious problem which has been found to be poorly managed. Early recognition and action is critical in potentially slowing or reversing its course and facilitating timely referral to specialist services. In this quality improvement project, multidisciplinary education sessions and a simple 'ABCDE' checklist to aid AKI management were introduced in a district general hospital. The incidence of AKI (defined as 26umol/l rise in creatinine), its recognition and management were measured hospital wide. AKI recognition was improved by educating the entire multidisciplinary team to identify three key early warning signs: a rise in serum creatinine, urine output of <500mls in 24 hours and systolic blood pressure of <90mmHg. The 'ABCDE' checklist (Address drugs, Boost blood pressure, Calculate fluid balance, Dip urine, Exclude obstruction) was introduced to prompt AKI management. A four week educational programme was delivered, initially on a pilot ward, to doctors, nurses, nursing assistants and pharmacists. AKI recognition and implementation of the 'ABCDE' checklist were measured. Prior to project introduction 16% of patients developed AKI, but were recognised within 24 hours in only 31% of cases, with 80% of 'ABCDE' steps implemented in only 20%. Following multidisciplinary education, AKI recognition improved to 100%, with 80% of 'ABCDE' steps implemented in 67% of cases. These results were replicated when the project was rolled out across the surgical directorate (120 beds) and in the 40 bed medical admission unit. Prevention and treatment of AKI should be a core competency of all clinical staff. Educating and empowering the multidisciplinary team to implement simple interventions improves standards and should be the foundation of strategies targeting AKI. Through this study significant improvements have been demonstrated in AKI recognition and management, positively impacting on patient safety, quality of care and patients' and staff experience.

Problem

Acute Kidney Injury (AKI) is a frequently encountered and expensive clinical problem. Although no definitive studies have been undertaken in the UK, the incidence of AKI in acute hospital admissions is estimated to be approximately 20%. Patients with AKI require longer hospital stays and have a poorer prognosis, with mortality ranging from 10-80% depending upon the population studied (1). In a general district hospital in Northern Ireland an audit was undertaken to assess the extent of the problem. It demonstrated that, similar to national figures, 16% of acute adult admissions had AKI and that their average length of stay was longer at 10.5 days compared to 6.9 days for all adult medical admissions. 20% of these patients would subsequently die within three months. It was evident that AKI was being poorly recognised and sub-optimally managed.

Background

Warning signs for AKI can be recognised easily by sensitive indicators including hypotension, reduced urine output and a rise in serum creatinine. It has been recognised recently that even small increases in creatinine are associated with worse patient outcomes. Published studies suggest a large percentage of episodes are preventable or potentially reversible through simple interventions such as fluid volume replacement, discontinuing and/or avoiding nephrotoxic agents, relief of urinary tract obstruction and early recognition of conditions causing rapid progression of AKI.
There are a number of clear, widely accessible clinical guidelines on AKI. The National Institute for Health and Clinical Excellence (NICE) AKI clinical guidance is in development and expected to be published in August 2013. Regionally, the Northern Ireland Guidelines and Audit Implementation Network (GAIN) published AKI guidelines in 2010 (2). They summarised their advice in a simple protocol which outlines how to recognise at risk patients, AKI and treatment considerations, including when to make a nephrology referral. They are based on the national Clinical Practice AKI guidelines published by the UK Renal Association (2008) (1). These guidelines formed the evidence base for the definitions and educational material used in this project.
AKI warranted a UK National Confidential Enquiry into Patient Outcome and Death (NCEPOD) report in 2009, entitled Adding Insult to Injury (3). It carefully examined the care of hospital patients who had died with a primary diagnosis of AKI. 50% of patients' management was judged to be suboptimal, with 20% of cases deemed to be predictable and avoidable. It stressed numerous clinical deficiencies on the part of the medical teams responsible for these patients including a lack of awareness and knowledge of AKI. There was an unacceptable delay in recognising post admission AKI in 43% of patients and 33% of patients had inadequate investigations. The omissions included basic clinical examination and simple laboratory tests. The report showed there is much work to be done to ensure AKI is recognised and prevented. A number of recommendations were proposed including the incorporation of postgraduate training in the detection, prevention and management of AKI in all specialities. The UK Renal Association has also stressed the pressing need for renal physicians to engage in educational programmes to improve the current management of AKI.

An example of good AKI practice is The London Acute Kidney Injury Network (4). Launched in 2009 it is an ambitious collaboration of healthcare professionals and organisations involved in acute kidney care throughout London. It has published AKI educational materials, guidelines, pathways and care bundles and is developing AKI electronic alerting.

Baseline Measurement

A baseline audit was undertaken in the Ulster hospital in December 2011, with the goal of identifying AKI incidence, recognition and management. All adult Accident and Emergency (A&E) non-surgical admissions during a one week period in September 2011 were included. A review of the electronic laboratory database identified AKI episodes in this cohort.

AKI was defined according to KDIGO (Kidney Disease: Improving Global Outcomes) criteria as a rise in serum creatinine of greater than 26umol/l or a 50% rise in creatinine from baseline. Baseline creatinine values were taken as the lowest recorded value in the twelve months prior to admission. Admission creatinine was the highest recorded during admission.

307 acute adult admissions from A&E were identified. 16.3% (50/307) developed AKI, but were recognised within 24 hours in only 31% of cases. Basic steps to ameliorate AKI (actions including urinalysis, commencing fluids, medication review, ultrasound imaging) were implemented in only 20%.

The aim of this quality improvement project was therefore to:
1) Improve early recognition of warning signs of AKI: a rise in serum creatinine, urine output of <500mls in 24 hours and systolic blood pressure of <90mmHg. (Target 80%).
2) Design a simple ABCDE checklist (see below) for AKI management. (50% AKI cases should have 80% of checklist actions considered).

Design

The pilot project was launched in March 2012 in a thirty bed surgical ward. Introductory teaching sessions were delivered first to doctors and then nurses, nursing assistants and pharmacists. On revisiting the ward two weeks later, it was clear that the warning signs and checklist were not in use and there was improvement in neither AKI recognition nor management. Expectations had been overly ambitious with too much information delivered too quickly. To create a change in practice it was clear that introduction of the above measures and checklist principles would need to be delivered in a staged manner.

Strategy

After this important lesson the delivery of the project was modified. A four week programme was introduced with short informal weekly teaching sessions used to train ward staff. One week was dedicated to each of the three warning signs and a final week to introduce the ABCDE checklist. Data was collected on each outcome, and the end of weeks 1, 2, 3 and 4. Immediate feedback to the MDT and two way discussion allowed us to constantly adjust the way we delivered teaching, collected data and modified the checklist before achieving a final list that was both user friendly and achievable. (See supplementary file for poster used).

The renal team visited the ward several times per week in order to promote the project, encourage participation, answer questions and feedback results.

Positive audit results from the pilot project (see supplementary files) were followed by roll out of the project first across all surgical wards with 120 beds (August-September 2012) and the medical admissions unit (MAU) with 40 beds (October-November 2012). The project was launched each time with teaching sessions introducing and increasing awareness of the project. The project was then delivered in a similar manner in both these patient areas as described above. Data collection methods differed, sampling being used in the surgical directorate wards and total numbers used on the MAU.

See supplementary file: Charts.docx

Post-Measurement

Two months post induction AKI recognitionwas 80%. At three months AKI recognition was 100%. 80% checklist compliance was achieved in 67% of AKI cases. Similar success with the project was observed across the surgical directorate and MAU.
Surgical directorate had an AKI recognition of 100% and 80% checklist compliance was achieved in 75% of AKI cases. On MAU AKI recognition was 100%. 80% checklist compliance was achieved in 83% of AKI cases.
(See supplementary file for run chart illustrating Recognition of Acute Kidney Injury and Action Taken).

Lessons and Limitations

This project clearly demonstrates that complicated measures are not necessary to improve standards. Simple interventions can successfully enhance patients' quality of care. The renal team was struck by the willingness of all MDT members to be educated and empowered to improve patient safety and experience. The valuable contribution of every member in obtaining successful results should not be underestimated; for example often it was nursing assistants who measured blood pressure and urine output and were consequently first to highlight positive warning signs to the rest of the team.
It was clear from the outset however, that if staff were to incorporate changes into daily practice, that these should be introduced gradually. Implementing this initiative therefore takes time. Consecutive weeks were taken within wards to train the team on one aspect of care for improvement at a time. Engagement of the renal team with ward staff was of fundamental importance. It required enthusiasm, motivation and sustained effort to maintain project momentum. Several ward visits were beneficial to allow interaction with as many staff as possible because of shift patterns.

Staff responded well to encouragement, praise and immediate feedback of positive results, which enabled them to engage and take ownership of the project on their own wards. The project's positive results were publicised throughout the hospital at directorate, audit and management meetings. The Northern Ireland Medical and Dental Training Agency expressed interest in including the checklist in their generic training AKI module for all junior doctors in Northern Ireland. The Trust has further endorsed the project by including it in their Quality Improvement Plan for 2012-2013 and consequently, a dedicated Quality Improvement Team has now been established in order to effect trust wide delivery.

Although this study demonstrates significant improvements in recognition and initial management of AKI, it has not yet demonstrated a reduction in AKI incidence or length of hospital stay. Our aspiration is that with increased and sustained compliance with the ABCDE checklist, including implementation in Accident and Emergency, that in time improvements in these outcome measures may be realised.

Conclusion

AKI has significant implications for patients and health care providers. Early recognition and action is critical to potentially ameliorate its course and facilitate timely referral to specialist services. Prevention and treatment of AKI should be a core competency for all clinical staff irrespective of profession or speciality. Educating and empowering the multidisciplinary team improves standards and should be the cornerstone of strategies aimed at addressing AKI. To improve identification, management and outcomes a systematic approach is required. The introduction of simple orderly interventions (three early warning signs and a logical management checklist) ensures AKI is considered and that basic clinical care is always delivered through a co-ordinated multidisciplinary approach.

Parallel initiatives will no doubt further enhance our performance, e.g. National implementation of E-warning systems for early recognition of AKI. However, our message is simple and relies upon the fundamental principles of communication, sharing and empowerment. Through this study significant improvements have been demonstrated in AKI recognition and management, positively impacting on patient safety, quality of care and the experience of both patients and staff.

References

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