

Has an increase in gentamicin prescribing resulted in a corresponding increase in gentamicin-associated acute kidney injury requiring renal replacement therapy? A retrospective audit

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Introduction

Acute kidney injury (AKI) previously known as acute renal failure has been estimated to have a prevalence of 4.9% of hospitalized patients in the USA¹. No definitive studies have been performed in the UK.

An important iatrogenic cause of AKI is **gentamicin**. The reported incidence varies widely due to variations in study design, toxicity definitions, patient population and concomitant risk factors although a reasonable estimate would be 10 to 20%, even when patients are carefully selected and closely monitored².

In most cases, the renal impairment is reversible. It classically causes non oliguric acute renal failure which manifests 5-7 days after starting therapy. The aminoglycoside can achieve concentrations vastly exceeding the concurrent serum concentration and cause distal renal tubular damage and electrolyte disturbances.

As a result of a change in antibiotic guidelines, **gentamicin** use has increased over the past 6 months in Greater Glasgow and Clyde hospitals. This is felt to have been as a result of a change in antibiotic guidelines. These were altered following a very well publicised rise in clostridium difficile cases and mortality particularly affecting the Vale of Leven hospital in Alexandria.

In addition to inadequate infection control measures, poor antibiotic prescribing was implicated and guidelines in Greater Glasgow and Clyde hospitals were changed accordingly.

Methods

I audited all those with AKI requiring renal replacement therapy (RRT) from 1st August 2007 until 31st January 2008, before the change in antibiotic policy, and 1st August 2008 until 31st January 2009, after the change in antibiotic policy.

The Glasgow Royal Infirmary and Western Infirmary, Glasgow renal unit electronic patient records and intensive care unit databases ("Wardwatcher") in Greater Glasgow and Clyde were interrogated in order to identify those who received RRT during these periods.

Those who were transferred from a hospital outwith Greater Glasgow and Clyde were excluded as were those post cardiac surgery and those with pre-existing endstage renal failure defined here as requiring haemodialysis, peritoneal dialysis or with estimated GRF less than 15 ml/min. Those with unknown renal function prior to presentation were included in this audit.

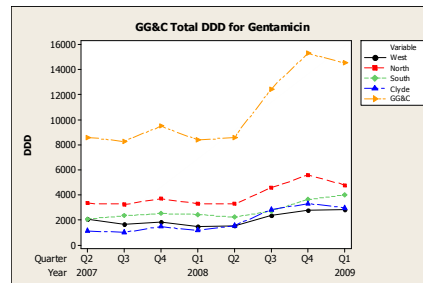


Figure 1

Pharmacy departments throughout Greater Glasgow and Clyde have audited **gentamicin** use from June 2007 until March 2009 by defined daily dose (DDD) and shown a statistically significant increase in **gentamicin** use from September 2007-March 2008 compared to the corresponding period the following year ($p < 0.05$). (Figure 1)

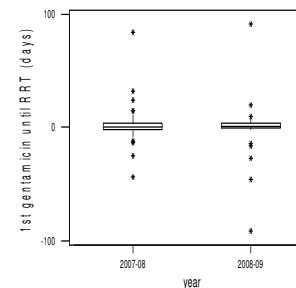
Results

196 patients were identified from 01/08/2007-31/01/08 and 182 patients from 01/08/08-31/01/09 who fit the above criteria and were collated into a database. Comorbidities, where known, were added. Date of first and last gentamicin dose was entered as was first and last session of RRT. Mortality and extent of renal recovery was also noted. There is no statistically significant difference in age and length of hospital admission and mortality in the 2 populations using the Mann Whitney U Test.

41% of patients from 2007-2008 and 35% of patients from 2008-2009 received gentamicin during their admission.

To examine this further, the relationship in days between receiving gentamicin and beginning RRT was calculated. Again, there is no statistically significant difference ($p = 0.29$). (Figure 2)

Figure 2



Conclusions

The concern that the increased gentamicin use secondary to a change in antibiotic guidance will result in a significant increase in dialysis requiring acute kidney injury appears to be unfounded at present.

Further prospective audit into AKI not requiring dialysis should be conducted as lesser degrees of AKI are also associated with significant mortality³. This is especially relevant as gentamicin toxicity classically manifests as non-oliguric acute kidney injury which may not be referred to renal services. Gentamicin associated ototoxicity should also be audited.

Once the dataset is complete, a multivariate analysis will be performed as there are bound to be confounding variables affecting outcome and prognosis of this patient group.

References

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 3. Lopes JA, Fernandes P, Jorge S, Gonçalves S, Alvarez A, Costa e Silva Z, França C, Prata MM. Acute kidney injury in intensive care unit patients: a comparison between the RIFLE and the Acute Kidney Injury Network classifications. Crit Care. 2008;12(4):R110. Epub 2008 Aug 28
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