A review of the comparative radiation exposure and costs associated with percutaneous nephrostomy tube vs ureteric stent insertion for emergency renal decompression

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Abstract
• The infected, obstructed kidney is a urological emergency requiring urgent decompression by percutaneous nephrostomy tube (PCNT) insertion or retrograde insertion of a ureteric stent (US).
• There are recognised risks and benefits between both approaches with patient factors, institutional facilities, clinician experience and preference influencing the decision making process.
• Financial cost and comparative exposure to ionising radiation are however not typically considered when deciding which modality of renal decompression is utilised.

Objectives
• The following study reviewed and compared the financial costs and levels of ionising radiation between retrograde insertion of a US and insertion of PCNT for the acute management of an infected, obstructed kidney.

Methods
• Retrospective review.
• All patients who underwent acute decompression for an infected, obstructed kidney at a tertiary hospital in Perth, Western Australia
  o Retrograde ureteric stent
  o Percutaneous nephrostomy tube
• 01 February 2015 to 31 June 2017
• Cost analysis performed to review procedural costs.
  1. Medical devices
  2. Imaging equipment
  3. Mobilisation of theatres
  4. Personnel
• Review of recorded doses of ionising radiation
  o Overall radiation exposure
  o Clinical relevance

Results
• 177 US's vs 142 PCNT's.
• Taking into consideration medical devices, imaging equipment and personnel, after-hours insertion of a retrograde US was approximately $650 compared to $2350 for insertion of a PCNT
  o Mobilisation of a specialist interventional suite
  o Staff including consultant interventional radiologist
• The average dose of ionising radiation for insertion of a PCNT compared to retrograde insertion of a US was 2120.44 Dose Area Product (DAP) vs 123.44 DAP respectively.

Conclusions
• Urgent decompression of an infected, obstructed kidney should occur without delay.
• Insertion of a PCNT is associated with an increased dose of radiation exposure and significantly increased financial cost compared with retrograde insertion of a US.
• Although a significantly higher DAP with PCNT vs US, the DAP value is still not clinically significant and unlikely to contribute to radiation-induced malignancy.
• Patient safety remains of paramount importance however cost and radiation exposure should be considered when deciding upon the modality of acute renal decompression.