Reducing inappropriate urine testing

Choosing wisely to prevent patient harm

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Disclosure

Dr Matthew Kelly, who led the interventions being evaluated, assisted in data analysis.

Dr Lynn McBain and Mr Aidan Wilson received grants from Council of Medical Colleges during the conduct of the study.
Do not give antibiotics for asymptomatic bacteriuria, unless pregnant or undergoing an urological procedure.

- Australasian Society for Infectious Diseases
- Australian & New Zealand Society for Geriatric Medicine
- Royal College of Pathologists of Australasia

Asymptomatic bacteriuria describes a patient with no signs or symptoms of a urinary tract infection but from whom bacteria have been isolated from a urine specimen.
Over-testing remains a massive problem

- More than half of urine cultures are not clinically indicated
- In the US 47% of admitted patients have urinalysis performed and 27% have urine culture performed
- In a NZ secondary hospital only 22% of all bacteriuria cases were true UTIs and 43% of antibiotic courses prescribed were inappropriate.


Testing urine is too easy

- Urine dipsticks have **no role** in the diagnosis of urinary infection for inpatients.
- If a patient has urinary symptoms or infection-of-unclear-source a urine sample should be sent to the lab.
- If a patient has no clinical evidence of infection then no urine testing should be done.
- “Are you convinced enough to start antibiotics empirically?”
  -> If not then do not request a urine test.
“I believe that urine tests are safe and present no harm or risk to the patient”

Survey of 14 house officers and 37 nurses at Hutt Hospital

<table>
<thead>
<tr>
<th>Agreement</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agree or Strongly agree</td>
<td>84%</td>
</tr>
<tr>
<td>Neutral</td>
<td>11%</td>
</tr>
<tr>
<td>Disagree or Strongly disagree</td>
<td>5%</td>
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</tbody>
</table>
Three important facts

1. Urine tests do not prove a patient has an infection no matter what any of the results show

2. Inappropriate urine testing leads to inappropriate treatment

3. Inappropriate treatment is harmful to patients

- Juthani-Mehta et al. Tests for urinary tract infection in nursing home residents. JAMA 2014; 312(16)
Interventions to reduce inappropriate urinalyses

- Removal of urine dipsticks from wards
- Education of nurses
- Education of house officers
- Promotion of empiric antibiotic guidelines

Hutt Hospital is a secondary hospital with approx. 240 inpatient beds serving a population of 150,000 people
Timeline of interventions

**March 2016**: No routine urine testing prior to implant surgery on orthopaedic ward

**December 2016**: Education around UTI diagnosis and appropriate use of urine tests to all house officers

**March 2017**: Placement of posters about antibiotic choice and duration of UTI treatment

**July 2017**: Education to house officers about change in antibiotic guidelines

**September 2016**: Removal of urine dipsticks from orthopaedic ward + education to nurses and house officers

**February 2017**: Removal of urine dipsticks from plastics ward + education to nurses

**June 2017**: Removal of urine dipsticks from medical wards + teaching of medical nurses

* this was repeated 3 monthly with each new rotation of house officers

** trimethoprim was removed as first-line treatment for urinary tract infections due to high resistant rates.
Evaluation of intervention

- Data on urine tests from January 2015 to October 2017 were obtained from Wellington Southern Community Laboratory (WSCL)

- Paediatric (less than 15 years of age) and mental health services were excluded

- Primary and secondary diagnostic codes for urinary infection (N39.0, N30.0, N30.9, N30.8) were extracted from the hospital dataset

- The study was approved by the University of Otago Ethics committee (ref D17/431).
Results

• 16,658 urine tests performed during the period analysed
• 82% of tests were requested on inpatients or ED patients
**Figure 2:** Monthly inpatient and outpatient urine culture requests from HVDHB from January 2015 to October 2017.

- Removal of dipsticks and education of nurses (orthopaedic ward)
- Placement of antibiotic choice posters
- Change in antibiotic guidelines
- Removal of dipsticks and education of nurses (medical ward)
- UTI education to house officers
- Removal of dipsticks and education of nurses (plastics ward)
- No routine testing prior to implant surgery
Rates of urine culture requests per month before and after interventions began

<table>
<thead>
<tr>
<th></th>
<th>Jan 2015 to Sept 2016 (before intervention)</th>
<th>Oct 2016 to Oct 2017 (after intervention)</th>
</tr>
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<tbody>
<tr>
<td><strong>Inpatients</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total number of urine culture requests</td>
<td>9,064</td>
<td>4,057</td>
</tr>
<tr>
<td>Rate of urine culture requests per month (95% CI in brackets)</td>
<td>432 (423–441)</td>
<td>312 (303–322)</td>
</tr>
<tr>
<td>Rate ratio (unexposed cf. exposed group)</td>
<td></td>
<td>0.72 (0.70–0.75)</td>
</tr>
</tbody>
</table>

| **Outpatients**            |                                             |                                           |
| Total number of urine culture requests | 1,820                                       | 1,082                                     |
| Rate of urine culture requests per month (95% CI in brackets) | 87 (83–91) | 97 (78–88) |
| Rate ratio (unexposed cf. exposed group) |                                            | 0.96 (0.89–1.03) |
Were patients with true UTI not being tested?

- Culture results were categorised as either “recognised uropathogen” or “not significant”
- 24% had recognised uropathogen
- 16% had skin or genital flora
- 60% had no growth
Proportion of urine cultures with a recognised uropathogen

2.2% increase pre- and post-intervention (p<0.05)
Primary and secondary diagnostic codes for urinary tract infections at HVDHB

17% decrease in diagnoses of UTI (p<0.05)
Has the change been sustained?

In 2018 there was a 49% reduction in the number of urine tests compared to 2015.
Success factors

• The intervention reduced workload for nurses and doctors

• Education gave people permission to do the right thing even though it was contrary to embedded practice

• Using quality improvement cycles and beginning with areas of least resistance

• A prolonged campaign which consistently reiterated the key messages
Conclusions

• There has been a marked decrease in urine tests performed at Hutt Hospital
• Reduced testing is likely to have reduced inappropriate treatment and patient harm
• Successful interventions usually require a prolonged effort
• The reduction has now stabilised and been sustained suggesting an embedded change in practice
Acknowledgments

Thank you to the **Council of Medical Colleges** for providing the Summer Student educational grant

- Aidan Wilson (*Summer Student*)
- Lynn McBain (*Summer Student Supervisor*)
- Sisira Jayathissa (*Summer Student Co-supervisor*)
- Emma Henderson (*Antimicrobial Pharmacist*)
- Tim Blackmore (*Clinical Microbiologist*)

Initial assessment and management of aged-care facility residents with suspected urinary tract infection

**Urinary tract infection (UTI) suspected**

- **Resident without indwelling catheter**
  - **Does the patient have acute dysuria?**
    - **NO**
      - Does the patient have **TWO or more criteria for UTI** (including at least **ONE** that is general)?
        - **General criteria**
          - fever [NB4]
          - mental status change without an alternative explanation
        - **Local criteria**
          - new or worsening urinary urgency
          - urinary frequency
          - suprapubic pain or tenderness
          - gross hematuria
          - costovertebral angle tenderness
          - new or worsening urinary incontinence
    - **YES**
      - Obtain urine sample for cultures and susceptibility testing.
      - Consider starting antibiotic therapy. See ‘Acute cystitis’, ‘Acute pyelonephritis’, or ‘Catheter-associated bacteriuria and urinary tract infections’ for recommendations. The duration of therapy does not need to be modified in this patient group; duration should always be stated on the prescription.

- **Resident with indwelling Foley or suprapubic catheter**
  - **Does the patient have ONE or more criteria for UTI?**
    - **fever** [NB4]
    - costovertebral angle tenderness
    - rigors with or without an identified cause
    - mental status change without an alternative explanation
  - **NO**
    - Not consistent with symptomatic UTI, so further investigation for UTI not recommended. Re-evaluate the patient for other infective or noninfective causes.
  - **YES**
    - Obtain urine sample for cultures and susceptibility testing.
    - Consider starting antibiotic therapy. See ‘Acute cystitis’, ‘Acute pyelonephritis’, or ‘Catheter-associated bacteriuria and urinary tract infections’ for recommendations. The duration of therapy does not need to be modified in this patient group; duration should always be stated on the prescription.
Cost savings

- Laboratory list price for a urine test is currently $29 per test
- Post-intervention there was an annual savings of $41,760
- Savings did not include reduced nursing workload or costs of urine dipsticks or antibiotics
Figure 3: Quarterly (Q) urine culture requests from HVDHB for emergency department and medical ward, from 2015-Q1 to 2017-Q3.
Figure 4: Quarterly urine culture requests from HVDHB separated by inpatient wards, general surgery and gynaecology (GSG), medical assessment and planning unit (MAPU), orthopaedics and plastics, from 2015-Q1 to 2017-Q3.
The Named-Bacteria Reflex

A clinician is 143.7 times* more likely to prescribe antibiotics if given the name of a bacteria

“This urine sample has a heavy growth of E. coli”
-> antibiotic prescription

“This urine sample has grown bacteria, call the lab for more details”
-> no phone call
-> no antibiotic prescription

*estimates may be somewhat exaggerated
Nurse Survey: UTI Signs/Symptoms

- **67.6%** of nurses incorrectly believe that an abnormal urine dipstick result is indication of UTI.
- **35.1%** of nurses are not aware that suprapubic tenderness is associated with UTIs.
- **86.5%** of nurses will take a urinalysis for a patient who has experienced increasing confusion.