

# Choosing Wisely CCDHB

Adam Sangster

SUPERVISOR/S **Associate Professor Lynn McBain,  
Professor Tim Blackmore**

SPONSOR **Council of Medical Colleges**

LOCATION **University of Otago Wellington**

# 1 TABLE OF CONTENTS

1	TABLE OF CONTENTS .....	2
2	ABSTRACT .....	3
3	INTRODUCTION .....	4
3.1	Literature Review .....	4
4	MATERIALS AND METHODS .....	6
4.1	Survey Methods .....	6
4.1.1	Survey Design .....	6
4.1.2	Timeframe .....	6
4.1.3	Recruitment .....	6
4.1.4	Survey Description .....	6
4.1.5	Statistical Analysis of Surveys .....	7
4.1.6	Management of Incorrectly Filled Surveys .....	7
4.1.7	Ethics Statement .....	7
4.2	Audit Methods .....	7
4.2.1	Obtaining Data .....	7
4.2.2	Analysing data .....	7
4.2.3	Ethics Statement .....	8
5	RESULTS .....	9
5.1	Survey .....	9
5.1.1	Respondents Description .....	9
5.1.2	Knowledge Questions .....	9
5.1.3	Opinions on Harm .....	9
5.1.4	Practice at LTCFs .....	11
5.2	Audit .....	13
6	DISCUSSION .....	15
6.1	Survey .....	15
6.1.1	Knowledge Questions .....	15
6.1.2	Opinions on Harm .....	15
6.1.3	Practice at LTCFs .....	16
6.1.4	Limitations .....	16
6.2	Audit .....	17
6.2.1	Significance and limitations of Results .....	17
6.2.2	Value of Removing Dipsticks .....	17
7	CONCLUSION .....	18
8	STUDENT .....	19
9	ACKNOWLEDGMENTS .....	19
10	CONFLICTS OF INTEREST .....	19
11	REFERENCES .....	20
12	APPENDICES .....	22
12.1	Appendix 1: Nurses Survey .....	22
12.2	Appendix 2: Doctor's Survey .....	24
12.3	Appendix 3: Tables .....	27
12.4	Appendix 4: Figures .....	28
12.5	Appendix 5: Other Data .....	30

## 2 ABSTRACT

### Introduction

Survey to investigate knowledge urinary tract infection (UTI) management, attitudes, and practice at long-term care facilities (LTCFs) and Kenepuru hospital.

Audit testing hypothesis that use of dipsticks in elderly care drives urine culture requests.

### Methods

Literature review.

Self-administered survey - December 2017.

Audit of urine cultures from four elderly care wards at Kenepuru hospital - January 2015 to October 2017.

### Results

Among nurses nonspecific signs and symptoms of UTI were seen as significant, especially confusion, described as "significant" by 97.2% (95% CI 99.7-90.3) of nurses. Nurses "believe that urine tests are safe and present no harm or risk to the patient" with 59.7% (47.5 - 71.1) strongly agreeing, and 30.6% (20.2 - 42.5) agreeing. Of LTCF nurses presented an elderly dementia patient with increased confusion and (+++) positive dipstick result, 65.1% (52.0 - 76.7) would treat.

Audit revealed 0.72 (95%CI 0.65-0.80) times as many urine cultures requested after dipsticks removed in September 2016.

### Discussion

Nurses see nonspecific symptoms as significant in identifying UTI in the elderly. Few nurses believe urine tests cause harm; possibly driving testing and treatment. LTCF nurses use a positive dipstick results as a positive indicator of UTI.

Audit shows removal of dipsticks correlated to decrease in urine cultures requested. Benefits are reduced time and cost burden, clinical benefit unknown.

### Conclusion

An educational intervention about the UTI treatment guidelines, harms, and value of dipsticks could reduce unnecessary testing and treatment.

Dipstick removal at Kenepuru hospital a benefit and could be considered elsewhere.

# 3 INTRODUCTION

This research aimed to investigate testing and treatment of urinary tract infections (UTI) in the elderly from a Choosing Wisely perspective, reducing unnecessary procedures. The components of this research are a literature review, survey, and audit. The survey aims to investigate staff knowledge of Urinary Tract Infection (UTI) guidelines, attitudes towards UTI testing and treatment, and practice in long-term care facilities (LTCFs) and Kenepuru hospital. The audit of the number of urine requests from Kenepuru hospital tests the hypothesis that use of dipsticks in the elderly drives requests for urine culture by examining if urine request rates changed with removal of dipsticks from the wards in 2016.

Between March and December 2017 the Capital & Coast District Health Board (CCDHB) received 19915 urine samples from over 65 year olds in the community and hospital, highlighting the significant amount of testing that is occurring.

## 3.1 Literature Review

Urinary tract infection (UTI) is the second most common cause of infectious disease hospitalisation in over-65 year-old adults (1). Bacteriuria does not indicate treatment, since untreated asymptomatic bacteriuria (ASB) has similar mortality and morbidity outcomes to treated bacteriuria (2), and leads to increased antibiotic resistance and antibiotic-associated side effects. (3)

Issues with diagnosis of UTI in the elderly exist due to vague signs and symptoms being associated with UTI, such as abnormal smell or colour of urine (4). Additionally some elderly patients are unable to communicate specific signs and symptoms of UTI. The elderly have a high rate of asymptomatic bacteriuria (ASB), with a prevalence of 15% to 30% among men and 25% to 50% among women (5). Therefore a high rate of testing (6) leads false positives, evidenced by a positive predictive value 12% for fever combined with bacteriuria as a marker of UTI. (5) Additionally while urine dipsticks are accurate at detecting pyuria this has little value in an asymptomatic patient due to pyuria not being specific for UTI, frequently occurring in other conditions such as vaginitis (7).

Guidelines (8) have been disseminated recommending against testing and treatment of UTI without specific genitourinary signs and symptoms. The Loeb Consensus criteria (9) are widely used to indicate UTI treatment. Recent research in New Zealand has shown a high rate of community urinalysis in the elderly population, likely leading treatment of ASB. (10)

Previous research on physicians has highlighted knowledge of practice as a significant driver in treatment of ASB, with one-third of ASB treated against guidelines, and patient factors such as positive dipstick results, haematuria, male gender and age increasing likelihood of treatment. (11) This research also highlighted that while treatment of ASB is widely seen as unnecessary, many physicians fail to recognise when to apply this knowledge in clinical vignettes, and the research recommends education as an intervention.

Qualitative investigation of high rates of testing and treatment highlighted interpretation of nonspecific changes in behaviour and urine characteristics as typical of a UTI, the prescriptions for UTI being done by doctors over the phone to nurses at LTCFs as areas for further investigation.(12). During these focus groups a theme emerged s disagreement over the significance of a positive dipstick result.

Several interventions have been trialled to reduce treatment of ASB. In the hospital setting educational programmes aimed at doctors (13–15), and complex multifaceted education programmes have been tried in LTCFs (13) with some success.

# 4 MATERIALS AND METHODS

## 4.1 Survey Methods

### 4.1.1 Survey Design

The researcher and supervisors developed questions for the survey based on the literature, in consultation with an infection control nurse, and revised after short interviews with nurses at Kenepuru Hospital. Questionnaires were anonymous and self-administered delivered as forms to the centres, also available as a PDF or online. (See appendix 1 and 2)

### 4.1.2 Timeframe

The surveys were distributed and collected from December 6 2017 to December 21 2017.

### 4.1.3 Recruitment

RMOs and Nurses at Kenepuru hospital, GPs associated with LTCFs and Nurses at LTCFs.

LTCFs in the CCDHB were recruited from a telephone list from infection control. An email was sent to inform LTCFs of recruitment by telephone to participate. LTCFs within delivery distance were telephoned, and survey delivery arranged. The surveys were given to the clinical manager to distribute among participating staff. The general practices associated with recruited LTCFs were identified at the LTCF and calling practices. The practice manager was contacted to organise distribution of the survey to GPs associated with LTCFs. Completed forms were mailed, scanned, or faxed to the researcher

Kenepuru nurses were recruited from at a handover meeting at 1pm, and given surveys to be collected later in the day by the charge nurse. RMOs were delivered the survey at a meeting, and were given collection boxes to return the surveys.

### 4.1.4 Survey Description

The survey for nurses consisted of a series knowledge questions, questions about facility policy, opinion questions on harms from testing, clinical vignettes on dipstick use, and questions on antibiotic use. (Appendix 1) The survey for GPs and RMOs consisted of a series of knowledge questions, questions about practice policy, opinion questions on harm of testing,

questions on receiving urine tests from nurses, and a series of clinical vignettes on testing and antibiotic use. (Appendix 2)

#### **4.1.5 Statistical Analysis of Surveys**

A biostatistician was consulted about the best approach for analysis of the surveys, and all questions with a count of nurse responses were analysed using Fisher's exact method for proportions. In question four participants ranked five methods of urine collection from one to five, generating ordinal data for which a mean, median, and mode were found.

#### **4.1.6 Management of Incorrectly Filled Surveys**

When the 1-5 ranking had them boxes filled with ticks instead of numbers, ticks were given a ranking of 3, and non-ticks were not included. When an option was written instead of selecting a given option it was classified as 'other'.

#### **4.1.7 Ethics Statement**

This survey was given departmental level ethics approval, and was reviewed by the Otago Human Ethics Committee (reference number D17/422.t).

## **4.2 Audit Methods**

### **4.2.1 Obtaining Data**

The data came from an extract from the laboratory information system. The data obtained were the number of urine tests sent from four wards associated with elderly care at a Kenepuru hospital from January 2015 to October 2017. Occupancy rates by midnight census were also obtained for this period from the Decision Support Unit (DSU) at Wellington Regional Hospital.

### **4.2.2 Analysing data**

A rate calculation to calculate the number of urines sent per patient day per month. The rate data was analysed using regression to determine if there has been a significant change in the urines sent over that time period. A confidence interval for rate ratio for urines sent per inpatient day before and after dipsticks were removed in December 2016 was calculated using Byar's approximation.

### **4.2.3 Ethics Statement**

The laboratory data on urine culture requests was regarded as an audit not requiring ethics committee approval.



# 5 RESULTS

## 5.1 Survey

### 5.1.1 Respondents Description

Of the 18 rest homes that met the criteria for inclusion, 16 rest homes were contacted for the study and 13 participated.

A total of 72 nurses, and 7 carers completed the survey. At the hospital 9 nurses in the geriatric ward completed the survey. Table 1 outlines the respondents.

Of the 17 doctors asked to participate, 6 doctors completed the survey in time for publication, 3 RMOs and 3 GPs.

### 5.1.2 Knowledge Questions

Nurses asked, “Which of the following would you consider significant signs or symptoms of a urinary tract infection?” and given a list of options (Appendix 1, Question 2) most commonly selected (Appendix 3, table 5) increasing confusion 97.2% (95% CI 99.7-90.3), burning sensation during urination 95.8% (88.3 - 99.1), and fever 87.5 (77.6 - 94.1). All options were frequently selected. When asked “Of these, which do you think are the two most significant?” the most frequently selected were increasing confusion 48.6% (36.7 - 60.7), fever 43.1% (31.4 - 55.3), and abnormal dipstick result 26.4 % (16.7 - 38.1).

Responses to the open question “If you obtained a dipstick result positive for leukocytes, what would be a few of the possible reasons for this positive result?” were categorised, with 69.4% (57.5 - 79.8) of respondents identifying UTI, 27.8% (17.9 - 39.6) identifying ‘contamination’, 2.8% (0.3 - 9.7) identifying false positive, and 4.2% (0.9 - 11.7) identifying ASB.

### 5.1.3 Opinions on Harm

Responses by all nurses surveyed to questions on possible harm caused by urine dipsticks, and the safety of testing of asymptomatic patients are displayed in figures 1 and 2. Among all nurses the statement “I believe that urine tests are safe and present no harm or risk to the patient.” Was strongly agreed with by 59.7% (47.5 - 71.1), agreed with by 30.6% (20.2 - 42.5),

Group	Location	Role	Number
Nurses	Hospital	Registered Nurse	5
		Other Specialist Nurse	4
		<b>Subtotal</b>	<b>9</b>
	LTCF	Enrolled Nurse	4
		Registered Nurse	45
		Clinical Manager	11
		Other Specialist Nurse	3
		<b>Subtotal</b>	<b>63</b>
			<b>Total Nurses</b>
Doctors	Hospital	RMO	3
		GP	3
			Total Doctors

Table 1: Characteristics of Survey Participants

neutral with 4.2 (0.9 - 11.7), disagreed with by 2.8% (0.3 - 9.7), strongly disagreed with by 1.4% (0.0 - 7.5), and 1.4% (0.0 - 7.5) of nurses surveyed did not complete that question.

### I Believe that Urine Tests are Safe and Present No Harm or Risk to the Patient

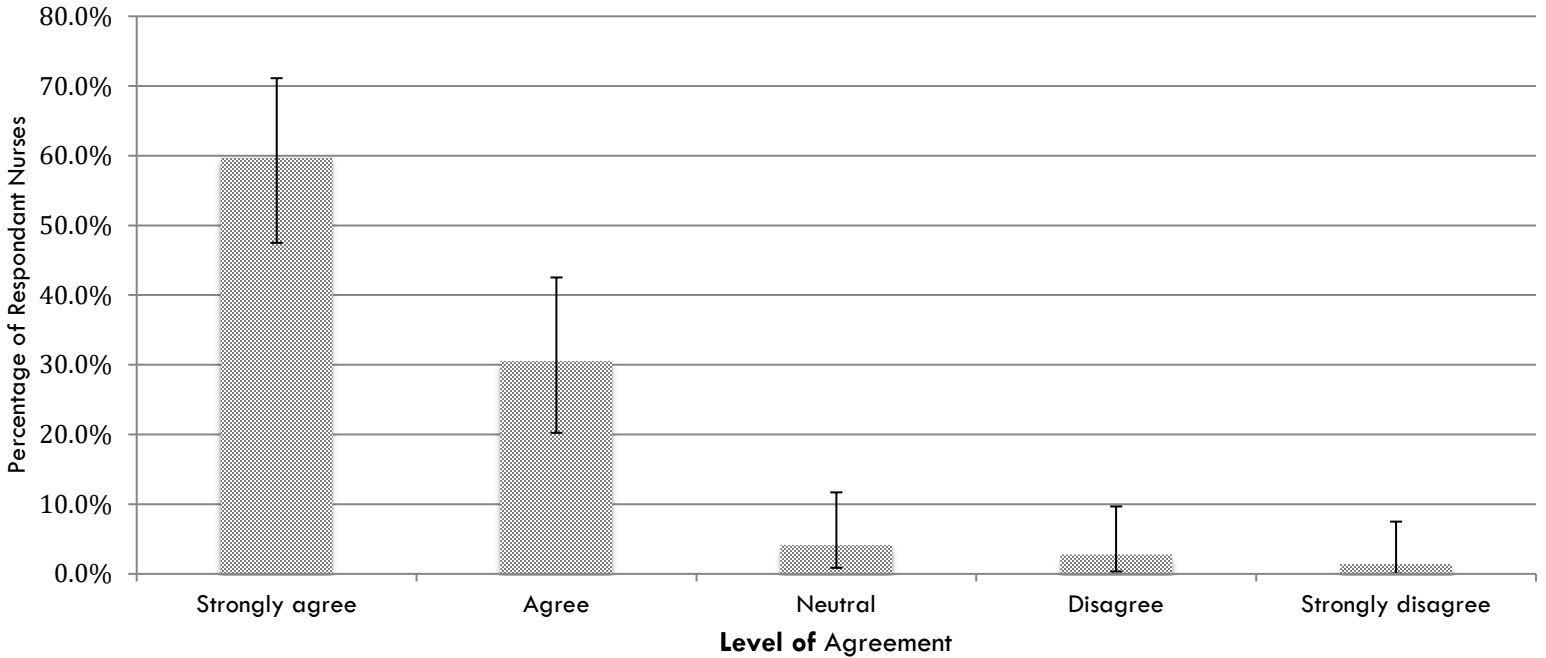


Figure 1: Nurses' agreement to the statement "I believe that urine Tests are safe and present no harm or risk to the patient"

Among all nurses the statement "I believe it is safer to request a urine test for a patient, even if there are currently no signs or infection, than to potentially miss a urinary tract infection" was strongly agreed with by 22.2 (13.3 - 33.6), agreed with by 23.6 (14.4 - 35.1), neutral to by 12.5 (5.9 - 22.4), disagreed with by 20.8 (12.2 - 32.0), and strongly disagreed with by 20.8 (12.2 - 32.0).

**I believe it is safer to request a urine test for a patient, even if there are currently no signs or infection, than to potentially miss a urinary tract infection.**

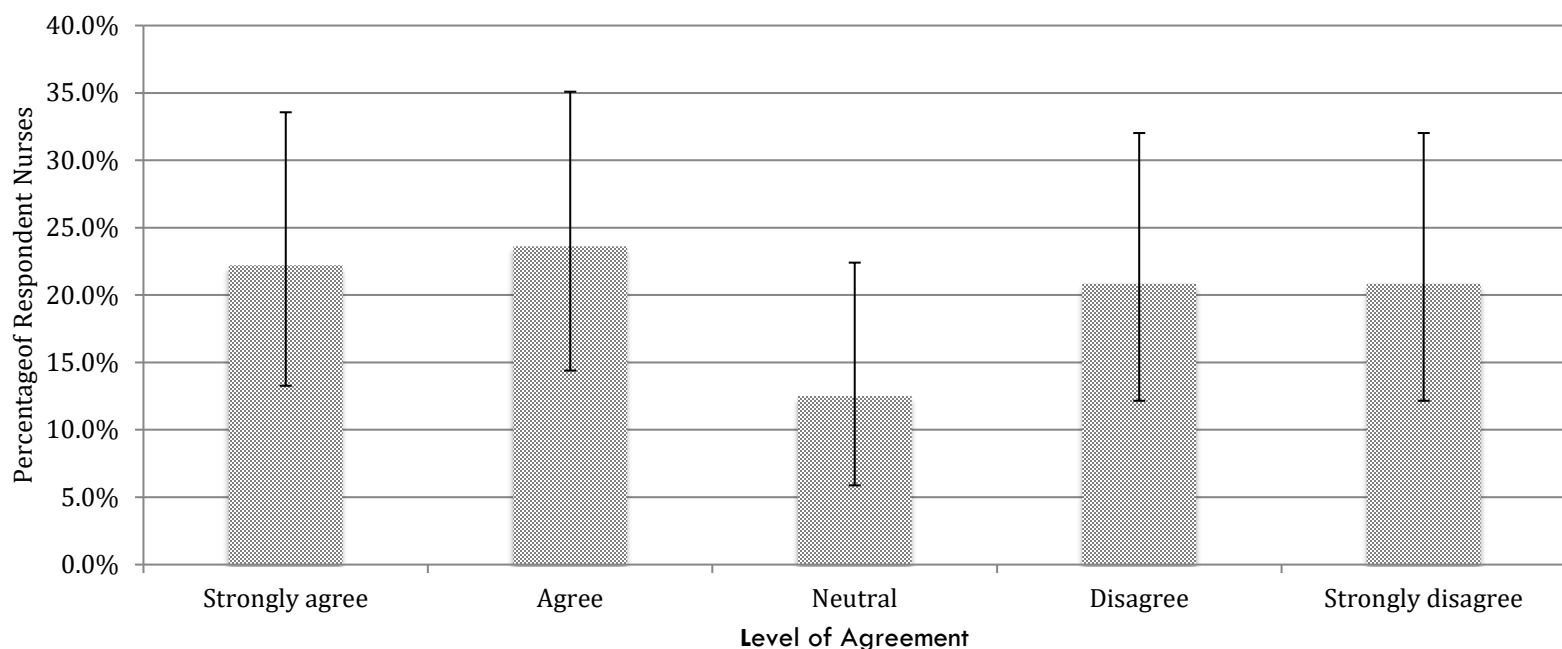


Figure 2: Nurses' Agreement to the Statement "I believe it is safer to request a urine test for a patient, even if there are currently no signs of infection, than to potentially miss a urinary tract infection."

**5.1.4 Practice at LTCFs**

When asked, "Which of the following most closely describes the policy for urine testing at your facility?" the responses were as displayed in table 2. Additionally between the 13 LTCFs there was some variation as at some the response was uniform, while responses at others were divided (Appendix 4, figure 4). At Kenepuru the policy is not to use dipsticks, however 2 of 9 nurses at the hospital selected that they still use dipsticks.

Policy Described	Number of Nurses	Proportion of LTCF Nurses, %
Urine dipstick and send sample to the lab.	19	30.2 (19.2 - 43.0)
Urine dipstick and only send sample to the lab if dipstick is abnormal.	40	63.5 (50.4 - 75.3)
No testing unless symptoms change or do not resolve.	1	1.6 (0.0 - 8.5)

Send urine sample to the lab with no dipstick testing.	1	1.6 (0.0 - 8.5)
Other or no response.	2	3.2 (0.4 - 11.0)

Table 2: LTCF Nurse Responses to: “Which of the following most closely describes the policy for urine testing at your facility?”

Responses LTCF nurses given options to describe about how they obtain antibiotics in a case of convincing cystitis are displayed in table 3. There was variation both between and within LTCFs. (Appendix 4, figure 5)

Policy Described	Number of Nurses	Proportion of LTCF Nurses, %
Use antibiotics on standing orders from a doctor for immediate treatment.	3	4.8 (1.0 - 13.3)
Call a doctor for permission or prescription to use antibiotics for immediate treatment.	32	50.8 (37.9 - 63.6)
Wait until culture results are returned and treat based off of results.	24	38.1 (26.1 - 51.2)
Other or no response.	4	6.3 (1.7 - 15.2)

Table 3: Responses to “ You have a non-catheterised elderly female patient with convincing signs and symptoms of cystitis. Urine has been sent for culture. Which of the following is the would be your preferred course of action?”

Answers by LTCF Nurses to clinical vignettes about patient presentation and dipstick use are displayed in table 4. Within these results it was also noted that there was variation both within and between LTCFs. (See appendix 4, figure 6/7)

Clinical Vignette	Proportion of LTCF Nurses, %			
	Yes	No	Unsure	No Answer
If an elderly patient showed clinical signs and symptoms of UTI and a dipstick test was negative (-) for leukocytes. Would your facility’s protocol recommend immediate antibiotic treatment for UTI?	31.7 (20.6 - 44.7)	<b>63.5</b> <b>(50.4 - 75.3)</b>	1.6 (0.0 - 8.5)	3.2 (0.4 - 11.0)
If an elderly patient with dementia was more confused than normal and a dipstick was (+++) for leukocytes. Would your facility’s protocol recommend immediate antibiotic treatment for a UTI?	<b>65.1</b> <b>(52.0 - 76.7)</b>	11.1 (4.6 - 21.6)	14.3 (6.7 - 25.4)	9.5 (3.6 - 19.6)

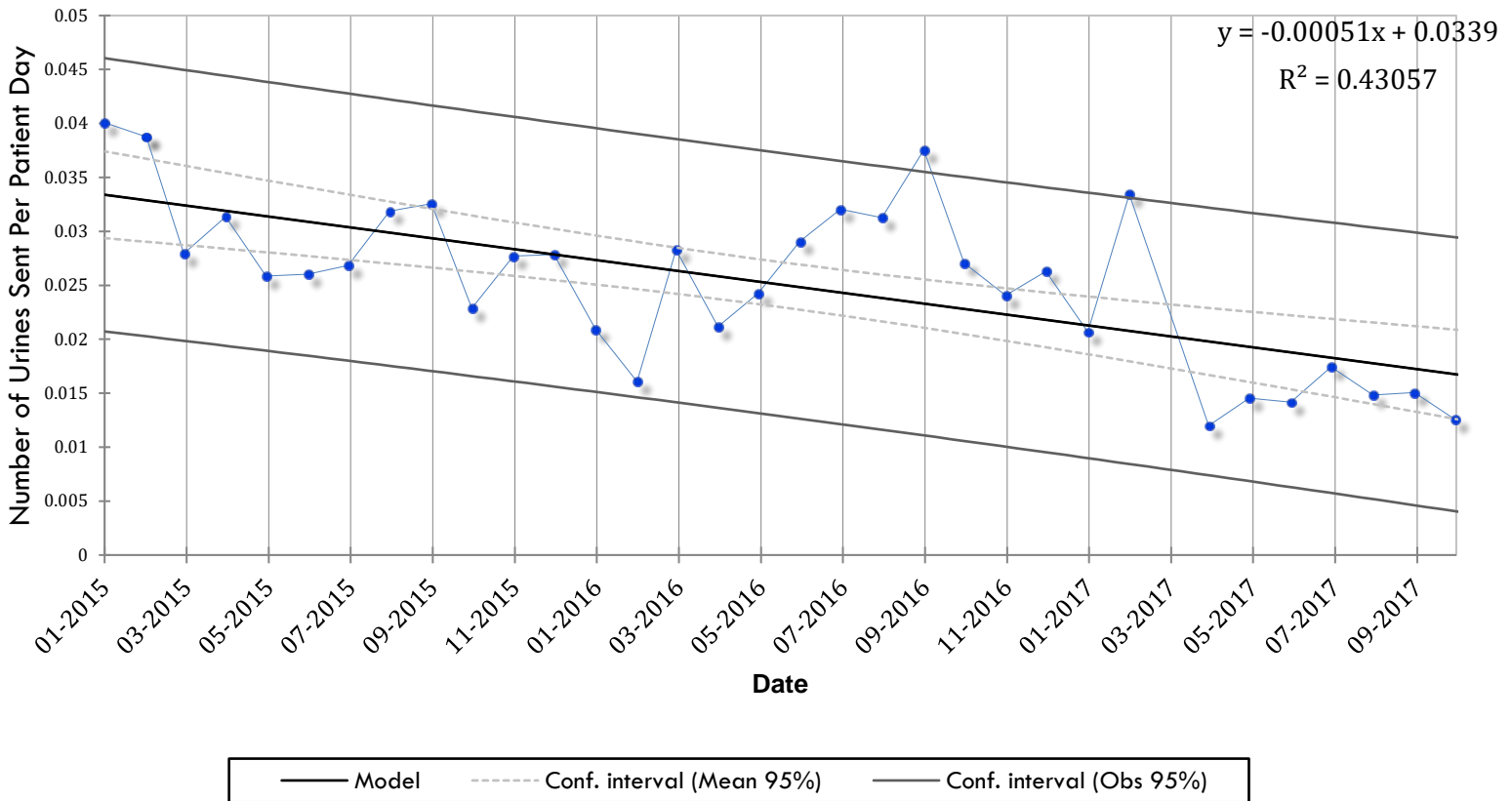
Table 4: Responses to LTCF Nurses to Clinical vignettes of patients with varying presentations and urine dipstick results.

Of the 13 LTCFs only one suggested that they do routine testing “weekly” when asked to write any times they routinely dipstick patients at their facility, with others responding that they either did not routinely test, tested when signs or symptoms are present only, or did not write an answer.

Insufficient numbers of doctors were recruited to provide quantitative statistics. Results are available upon request.

## 5.2 Audit

**Number of Urines Sent from Four Wards at Kenepuru Hospital per Patient Day between January 2015 and October 2017**



**Figure 3: Results of Audit of Kenepuru Hospital Urine Culture Requests**

The number of urines sent per patient day is decreasing at a rate of 0.00051 urines per patient day per month in the period between January 2015 and October 2017. There is 95% confidence that the true value for this trend lies between 0.00072 and 0.00029 urines per patient day per month, as this excludes the null value of zero there has been a significant decrease in the rate of urines cultures requested over the period.

The rate of urines tested before September 2016 was 0.028 urines per patient day, and the rate of urines tested including and after September 2016 was 0.020 urines per patient day. Therefore after dipsticks were removed from Kenepuru hospital 0.72 times as many urines were sent for culture. We are 95% confident the true value for this rate ratio lies between 0.65,

and 0.80, which excludes the null value of one, therefore after the removal of dipsticks there was a statistically significant decrease in rate of urine cultures requested.

# 6 DISCUSSION

## 6.1 Survey

### 6.1.1 Knowledge Questions

UTI in the elderly often presents with nonspecific signs and symptoms, creating confusion over when to treat. A 2016 review (16) suggested clinical deterioration with nonspecific symptoms does not support a UTI diagnosis in bacteriuric elderly patients. In our survey 97.2% (95% CI 99.7-90.3) of respondent nurses selected confusion as significant and 46.8% (60.6-36.7) selected it as one of the two most important signs of UTI, consistent with a past survey. (17) However guidelines do not suggest new onset of delirium is a symptom unless catheterised, (9) due to similar rates of confusion among those with both symptomatic UTI and ASB. (18) Other nonspecific symptoms such as cloudy urine 76.4% (64.9 - 85.6), smelly urine 83.3% (72.7 - 91.1), and a recent fall 59.7% (47.5 - 71.1) were seen as significant, but few nurses saw them as one of the two most significant. Specific symptoms such as burning sensation during urination 95.8% (88.3 - 99.1) and fever 87.5% (77.6 - 94.1) were more frequently seen as significant, suggesting nurses believed specific symptoms were more important, but still used nonspecific symptoms in their decision-making.

The popularity of the 'abnormal dipstick result' 76.4% (64.9 - 85.6) as a sign of UTI was of note. A review by the Scottish Intercollegiate Guidelines Network (8) found that evidence for dipsticks were poor, with positive dipsticks less likely to predict bacteriuria than signs and symptoms. The high rate of ASB in the elderly limits the value of abnormal dipstick results. This links to the nurses' responses when asked about causes of a positive dipstick result, as only a small number responded with ASB or false positive, suggesting that ASB is infrequently considered clinical practice.

### 6.1.2 Opinions on Harm

Only 4.2% of nurses disagreed with the statement that urine testing could not do harm. A significant aspect of the Choosing Wisely campaign is reduction in unnecessary tests, as harm arises from risky procedures, false positives, or true positives leading to unnecessary treatment. ASB can cause positive urine culture, increasing the likelihood patients receive

unnecessary antibiotic treatment, causing antimicrobial resistance and adverse reactions to antibiotics. This low perceived harm may drive unnecessary testing and treatment.

### **6.1.3 Practice at LTCFs**

Nurses appear weigh dipstick results heavily when making treatment decisions. When presented an elderly patient who has signs and symptoms of a urinary tract infection but a negative dipstick, 63.5% (50.4 - 75.3) of nurses believed that their facility's policy would not indicate immediate treatment, using the dipstick to 'rule out' the diagnosis of urinary tract infection. For an elderly patient with the nonspecific presentation of having dementia with increased confusion and a positive dipstick result, 65.1% (52.0 - 76.7) of nurses reported their facility policy would indicate treatment, using the dipstick as a positive marker of urinary tract infection. This shows decisions to treat are made largely on the results of the dipstick, something not recommended in this elderly age group due to the high rates of ASB. This raises questions about the awareness of ASB among LTCF nurses. Additionally some LTCFs had one consistent answer while others varied, suggesting differences in awareness of policy.

Among LTCF nurses 63.5% (50.4 - 75.3) of reported dipstick testing and only sending the sample to the lab if it is abnormal, with 30.2% (19.2 - 43.0)% sending the urine regardless of the dipstick results. At only one LTCF the clinical manager reported weekly routine testing, suggesting guidelines recommending against routine dipstick testing are widespread. The symptomatic threshold for testing appears to be low, since many nonspecific signs and symptoms were selected as significant and there is a low perception of risk to resting, which may lead to similar outcomes to routine testing.

### **6.1.4 Limitations**

There was a limitation in the distance in which homes could be recruited, so if practice were systematically different on the Kapiti coast this would not be reflected. When the researcher was recruiting some homes would mention new branches that they had developed recently, suggesting the list was incomplete. Homes that chose not to participate may have had systematically different practice to those that did choose to participate.

Since surveys were self administered at the facilities there is the possibility that some answers were collaborative. This could be an alternative explanation to policy for why answers at some LTCFs were consistent, and others were not. Some homes had more nurses complete the



surveys than others. For some of my results e.g. knowledge questions, this would not have impacted the results, however for questions on policy this would bias my results towards centres with greater participation unless results are viewed by centre (Appendix 4). Furthermore voluntary participants could have different knowledge and opinions than nonparticipants at each centre, causing bias in the results.

## **6.2 Audit**

### **6.2.1 Significance and limitations of Results**

The hypothesis that use of dipsticks in the elderly drives increased requests for urine culture cannot be rejected since 0.72 (0.65 - 0.80) times as many urine cultures were requested after dipsticks were removed. The clinical significance cannot be determined from this investigation, as outcomes for patients are not known and a causal link between the removal of the dipsticks and the decrease in urine cultures requested cannot be made. The trend of decreasing urine requests could be explained by other factors such as a decrease in urinary tract infection due to developments in hygiene policy.

### **6.2.2 Value of Removing Dipsticks**

The known benefits of dipstick removal are cost and time in the wards, and patients undergoing fewer procedures, which align with Choosing Wisely principles. If there is a causal link in the correlation between removal of the dipsticks and reduced urine cultures requested can only be determined in an interventional study, but current literature suggests that removal of dipsticks is not harmful (8) and therefore their removal is likely to be a net benefit.

## 7 CONCLUSION

This research has highlighted areas of knowledge, opinions, and practice among nurses leading to increased testing and treatment of ASB. These include the widespread view nonspecific symptoms are significant indicators of UTI, the belief urine testing cannot cause harm, and use of dipsticks as negative and positive markers of infection. These findings could be useful in development of educational interventions for testing and treatment of UTI in the elderly, reducing harms through a Choosing Wisely approach.

Qualitative research building on survey findings could be valuable in designing educational interventions to change dipstick use and identify why the reasons behind the findings of the survey. Furthermore the completion of surveys by doctors to investigate if doctors have differing drivers of testing and treatment of UTI in the elderly could be valuable.

The removal of dipsticks from the wards at Kenepuru is likely a positive outcome overall. The savings in cost and time, along with a correlation to decreased urines sent for culture delivers a benefit outweighing by potential harms. Other centres should consider removal of dipsticks from their wards.

Thank you to the Council of Medical Colleges for sponsoring this project, and giving me the opportunity to learn so much.

## 8 STUDENT

**Name:** Adam Brett Sangster

**Email:** sanad291@student.otago.ac.nz

**Supervisor/s:**

Associate Professor Lynn McBain, Professor Tim Blackmore

Host Department: Department of Primary Health & General Practice

Institution: University of Otago

Address: Wellington School of Medicine & Health Sciences  
PO Box 7343  
Wellington 6242

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## 10 CONFLICTS OF INTEREST

None Declared

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# 12 APPENDICES

## 12.1 Appendix 1: Nurses Survey

### Testing Patterns of Urinary Tract Infection in the Elderly

We would be grateful if you could complete this short survey about urine testing of the elderly in the CCDHB. There is no obligation to complete this survey, as it is entirely voluntary. The results from this survey are anonymous, and will be used for academic research and teaching at participating centres upon request. Your completion of this survey implies consent of the use of these responses.

1. What is your position? .....

2. Which of the following would you consider significant signs or symptoms of a urinary tract infection? (Please choose **as many** as apply)

- |   |   |
|---|---|
| <input type="checkbox"/> Burning sensation during urination | <input type="checkbox"/> Blood in urine           |
| <input type="checkbox"/> Frequent urination                 | <input type="checkbox"/> Abnormal dipstick result |
| <input type="checkbox"/> Increasing confusion               | <input type="checkbox"/> Smelly urine             |
| <input type="checkbox"/> Recent fall in the elderly patient | <input type="checkbox"/> Cloudy urine             |
| <input type="checkbox"/> Suprapubic tenderness              | <input type="checkbox"/> Fever                    |

Of these, which do you think are the two most significant?

.....

3. If you obtained a dipstick result positive for leukocytes, what would be a few of the possible reasons for this positive result?

.....

4. Please **number** boxes below rank the following methods of urine collection from 1 (most likely to produce a clean urine sample) to 5 (least likely to produce a clean urine sample).

- |                                      |   |   |
|--------------------------------------|---|---|
| <input type="checkbox"/> Midstream   | <input type="checkbox"/> From newly inserted catheter | <input type="checkbox"/> From indwelling catheter |
| <input type="checkbox"/> Clean catch | <input type="checkbox"/> From pad or bag              |   |

5. A previously well, non-catheterised, elderly patient has a suspected urinary tract infection.

a. What nursing care would be delivered?

.....

.....

b. Which of the following most closely describes the policy for testing of this patient at your facility? (Please **select one**)

- Urine dipstick and send sample to the lab.
- Urine dipstick and only send sample to the lab if dipstick is abnormal.
- Send urine sample to the lab with no dipstick testing.
- No testing unless symptoms change or do not resolve.

Please explain your preferred course of action if none of the above apply.

.....

1

6. Please write any times when you routinely dipstick urine of elderly patients at your facility.

.....

#### Opinion Questions

7. I believe it is safer to request a urine test for a patient, even if there are currently no signs or infection, than to potentially miss a urinary tract infection.

Strongly agree      Agree      Neutral      Disagree      Strongly disagree

8. I believe that urine tests are safe and present no harm or risk to the patient.

Strongly agree      Agree      Neutral      Disagree      Strongly disagree

#### Case Questions

9. If an elderly patient showed clinical signs and symptoms of UTI and a dipstick test was negative (-) for leukocytes.

Yes  
 No  
 Unsure

Would your facility's protocol recommend immediate antibiotic treatment for UTI?

10. If an elderly patient with dementia was more confused than normal and a dipstick was +++ for leukocytes.

Yes  
 No  
 Unsure

Would your facility's protocol recommend immediate antibiotic treatment for a UTI?

11. You have a non-catheterised elderly female patient with convincing signs and symptoms of cystitis. A urine has been sent for culture.

Which of the following would be your preferred course of action? (please select one)

- Call a doctor for permission or prescription to use antibiotics for immediate treatment.
- Use antibiotics on standing orders from a doctor for immediate treatment.
- Wait until culture results are returned and treat based off of results.

12. If you decided to empirically treat the patient in Question 11, given the patient has normal renal function and no allergies, please list the antibiotic(s) you would most likely use.

.....

Thank you for your completion of this survey!

## 12.2 Appendix 2: Doctor's Survey

### Testing Patterns of Urinary Tract Infection in the Elderly

We would be grateful if you could complete this short survey about urine testing of the elderly in the CCDHB. There is no obligation to complete this survey, as it is entirely voluntary. The results from this survey are anonymous, and will be used for academic research and teaching at participating centres upon request. Your completion of this survey implies consent of the use of these responses.

#### Background Questions

1. What is your position? .....

2. Which of the following would you consider significant signs or symptoms of a urinary tract infection? (Please choose as many as apply)

- |   |   |
|---|---|
| <input type="checkbox"/> Burning sensation during urination | <input type="checkbox"/> Blood in urine           |
| <input type="checkbox"/> Frequent urination                 | <input type="checkbox"/> Abnormal dipstick result |
| <input type="checkbox"/> Increasing confusion               | <input type="checkbox"/> Smelly urine             |
| <input type="checkbox"/> Recent fall in the elderly patient | <input type="checkbox"/> Cloudy urine             |
| <input type="checkbox"/> Suprapubic tenderness              | <input type="checkbox"/> Fever                    |

Of these, which do you think are the two most significant?

.....  
.....

3. Please number the boxes below to rank the following methods of urine collection from 1 (most likely to produce a 'clean' urine sample) to 5 (least likely to produce a clean urine sample).

- |   |
|---|
| <input type="checkbox"/> Midstream                    |
| <input type="checkbox"/> From newly inserted catheter |
| <input type="checkbox"/> Indwelling catheter          |
| <input type="checkbox"/> Clean catch                  |
| <input type="checkbox"/> From pad or bag              |

4. If an elderly patient has a suspected urinary tract infection which of the following is your preferred course of action? (Please tick just **ONE** answer)

- |  |
|--|
| <input type="checkbox"/> Urine dipstick and send sample to the lab.                              |
| <input type="checkbox"/> Urine dipstick and only send sample to the lab if dipstick is abnormal. |
| <input type="checkbox"/> Send urine sample to the lab with no dipstick testing.                  |
| <input type="checkbox"/> No testing unless symptoms change or continue.                          |

Please explain your reasoning for how you answered the question above.

.....

5. Please write any times when you routinely dipstick urine of elderly patients

.....



**Opinion Questions**

6. I believe it is safer to request a urine test for a patient, even if there are currently no signs or infection, than to potentially miss a urinary tract infection.

Strongly agree	Agree	Neutral	Disagree	Strongly disagree
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

7. What is the most common reason for you to receive laboratory urine culture results from elderly patients in care (rest home or hospital)?

- Culture sent by own request after visiting/seeing patient.
- Culture sent by nurse who suspected a UTI.

8. How often do you receive a urine culture result without prior knowledge that a test had been ordered? Please select the option that most closely describes your experiences.

- Multiple times a month
- Less than once per month
- Less than once per year
- I never have

**Case Questions**

*Your patient is a non-catheterised, 79-year-old female on day 2 following a surgery on a fractured ankle. She is reported to be grimacing on urination and feverish, with no other urinary symptoms or signs of infection.*

1. How likely are you to request a urine test for this patient?

Very unlikely	Unlikely	Neutral	Likely	Very likely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. How likely are you to start empiric antibiotic therapy for this patient before test results are received?

Very unlikely	Unlikely	Neutral	Likely	Very likely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. If the microbiology results report growth of *E. coli* but the patient has not developed any new symptoms, how likely are you to start or change antibiotic treatment?

Very unlikely	Unlikely	Neutral	Likely	Very likely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Again your patient is a non-catheterised, 79-year-old female on day 2 following a surgery on a fractured ankle. She is reported to have an offensive urine, with no other urinary symptoms or signs of infection.*

1. How likely are you to request a urine test for this patient?

Very unlikely	Unlikely	Neutral	Likely	Very likely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. How likely are you to start empiric antibiotic therapy for this patient before test results are received?

Very unlikely	Unlikely	Neutral	Likely	Very likely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. If the microbiology results report growth of *E. coli* but the patient has not developed any new symptoms, how likely are you to start or change antibiotic treatment?

Very unlikely	Unlikely	Neutral	Likely	Very likely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Your patient is a catheterised, 79-year-old female on day 2 following a surgery on a fractured ankle. She is reported to have an offensive urine and is tugging on her catheter, with no other urinary symptoms or signs of infection.*

1. How likely are you to request a urine test for this patient?

Very unlikely	Unlikely	Neutral	Likely	Very likely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. How likely are you to start empiric antibiotic therapy for this patient before test results are received?

Very unlikely	Unlikely	Neutral	Likely	Very likely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. If the microbiology results report growth of *E. coli* but the patient has not developed any new symptoms, how likely are you to start or change antibiotic treatment?

Very unlikely	Unlikely	Neutral	Likely	Very likely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*Again your patient is a catheterised 79-year-old female on day 2 following a surgery on a fractured ankle. This time she is reported as having fever and lethargy, with no other urinary symptoms or signs of infection.*

1. How likely are you to request a urine test for this patient?

Very unlikely	Unlikely	Neutral	Likely	Very likely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2. How likely are you to start empiric antibiotic therapy for this patient before test results are received?

Very unlikely	Unlikely	Neutral	Likely	Very likely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3. If the microbiology results report growth of *E. coli* but the patient has not developed any new symptoms, how likely are you to start or change antibiotic treatment?

Very unlikely	Unlikely	Neutral	Likely	Very likely
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

*You decide to empirically treat a non-catheterised elderly female patient with convincing symptoms of cystitis. Knowing she has normal renal function and no allergies:*

Please list your first and second choice in antibiotics respectively.

1. First choice .....
2. Second choice .....

Thank you for your completion of this survey!

### 12.3 Appendix 3: Tables

Sign or Symptom	Percentage Surveyed Nurses Describing it as “Significant” (%)	Percentage of Surveyed Nurses who Would Rank it as one of the “Two Most Significant” (%)
Increasing confusion	97.2 (90.3 - 99.7)	48.6 (36.7 - 60.7)
Burning sensation during urination	95.8 (88.3 - 99.1)	43.1 (31.4 - 55.3)
Fever	87.5 (77.6 - 94.1)	23.6 (14.4 - 35.1)
Frequent urination	83.3 (72.7 - 91.1)	23.6 (14.4 - 35.1)
Smelly urine	83.3 (72.7 - 91.1)	13.9 (6.9 - 24.1)
Cloudy Urine	76.4 (64.9 - 85.6)	5.6 (1.5 - 13.6)
Abnormal dipstick result	76.4 (64.9 - 85.6)	26.4 (16.7 - 38.1)
Recent fall in elderly patient	59.7 (47.5 - 71.1)	5.6 (1.5 - 13.6)
Blood in urine	55.6 (43.4 - 67.3)	6.9 (2.3 - 15.5)
Supraubic tenderness	48.6 (36.7 - 60.7)	2.8 (0.3 - 9.7)

Table 5: Responses to Questions about UTI Signs and Symptoms Knowledge

## 12.4 Appendix 4: Figures

Count of responses to: "You have a non-catheterised elderly female patient with convincing signs and symptoms of cystitis. A urine has been sent for culture. Which of the following would be your preferred course of action?" by LTCF

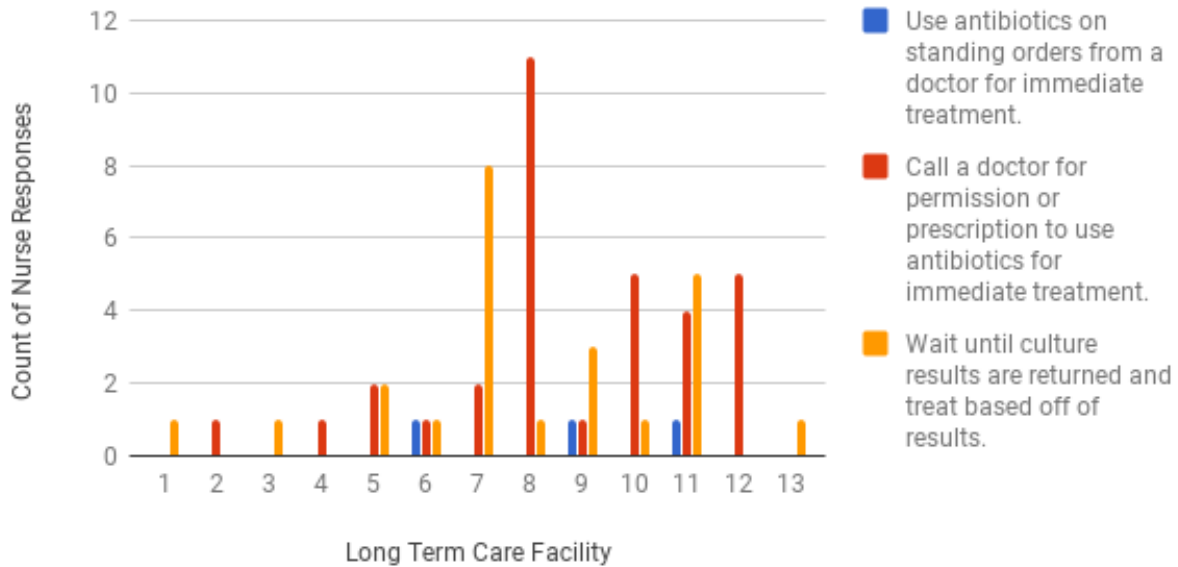


Figure 4: Variation in Responses Between and Within LTCFs

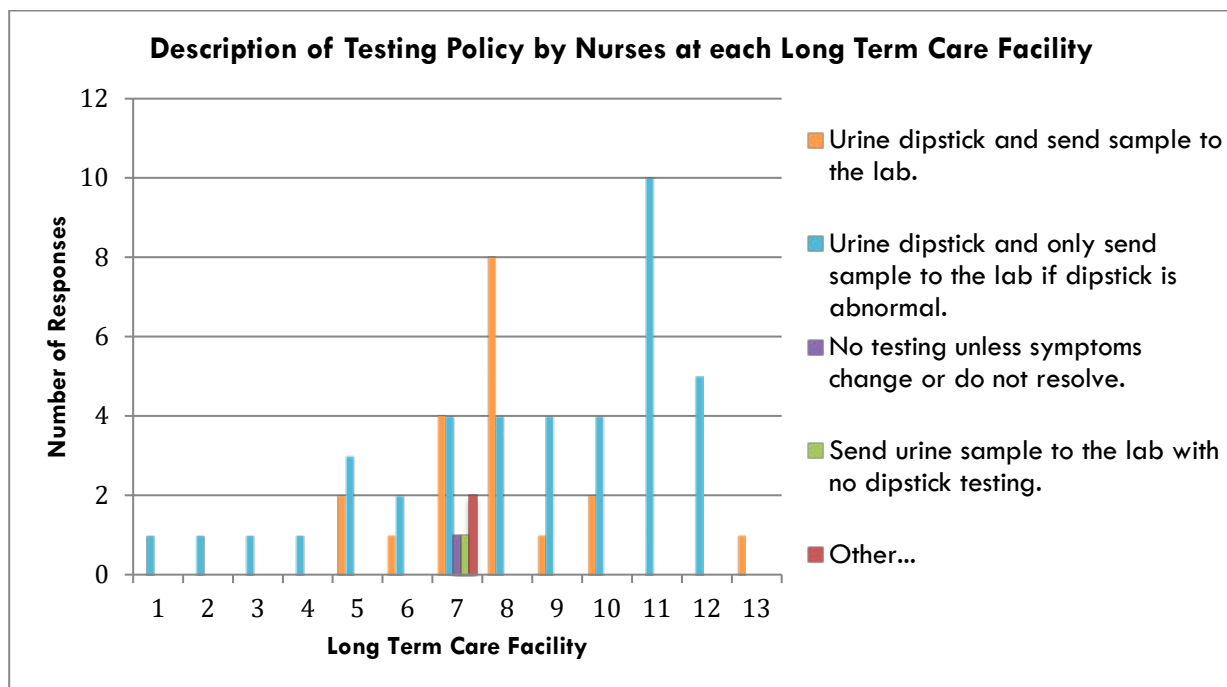


Figure 4: Variation in Responses Between and Within LTCFs

### LTCF Responses to Clinical Vignettes By Location - Patient with Signs and Symptoms but Negative Dipstick

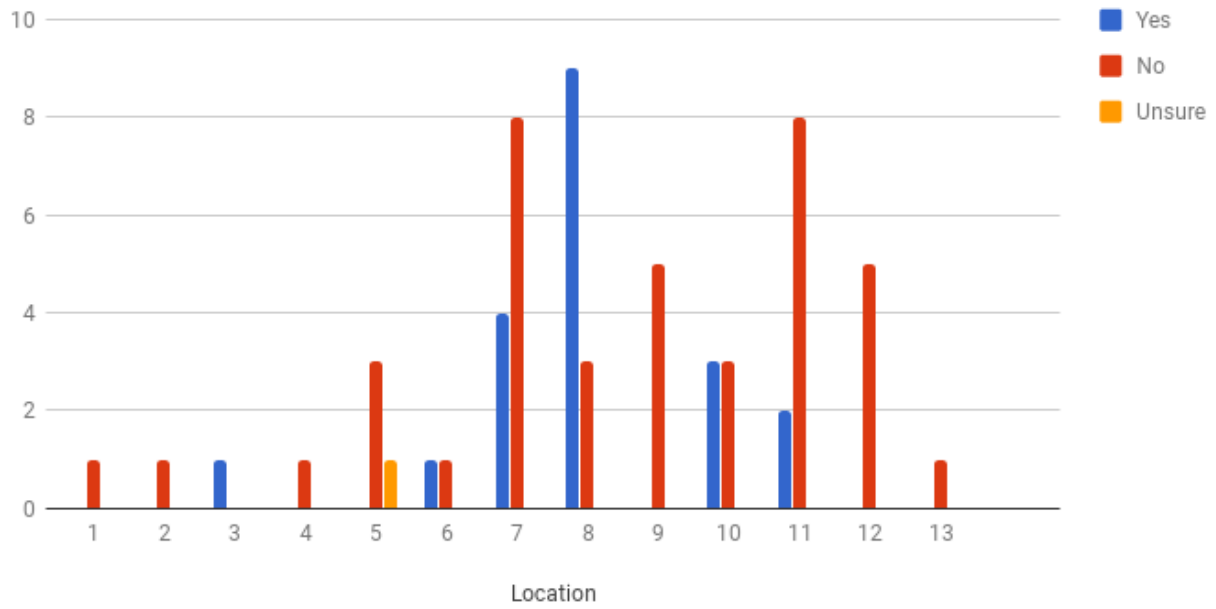


Figure 5: Variation in responses Between and Within LTCFs

## LTCF Responses to Clinical Vignettes By Location - Patient without Signs and Symptoms but Positive Dipstick

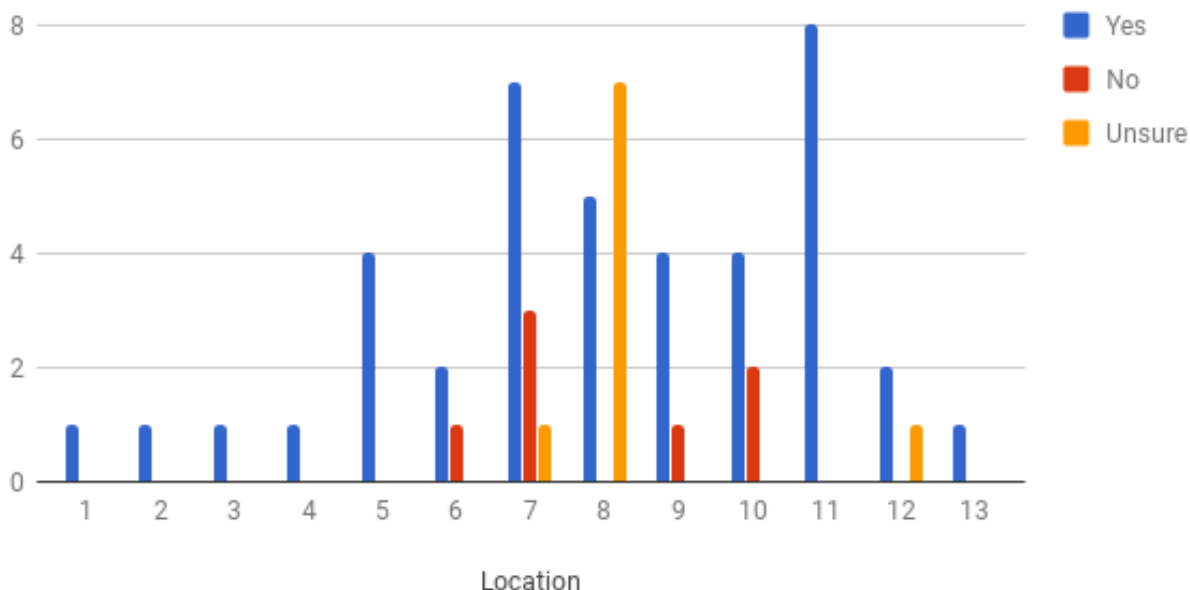


Figure 6: Variation in Responses Between and Within LTCFs Figure 7: Variation in Responses Between and Within LTCFs

### 12.5 Appendix 5: Other Data

#### Nurses

Cause of Leukocytes	Count of Nurses Selecting	Proportion of Respondent Nurses, %
UTI	50	69.4 (57.5 - 79.8)
Contamination	20	27.8 (17.9 - 39.6)
Other urinary disease	7	9.7 (4.0 - 19.0)
Cancer	2	2.8 (0.3 - 9.7)
Fluid	7	9.7 (4.0 - 19.0)
Drugs/Foods	1	1.4 (0.0 - 7.5)
Trauma	2	2.8 (0.3 - 9.7)
Intercourse	1	1.4 (0.0 - 7.5)
Other Nonurinary disease	1	1.4 (0.0 - 7.5)
False positive	2	2.8 (0.3 - 9.7)
ASB	3	4.2 (0.9 - 11.7)
Full bladder	2	2.8 (0.3 - 9.7)
Pregnancy	1	1.4 (0.0 - 7.5)

All nurse responses to: If you obtained a dipstick result positive for leukocytes, what would be a few of the possible reasons for this positive result?

Method Of Collection	Average Ranking From 1-5	Stdev	Mode	Median	Upper CI	Lower CI
MSU	1.739130435	0.868605609	1	1	0.204112311	0.201093217
New Catheter	2.294117647	0.864884144	3	2.5	0.20323781	0.203559065
Clean Catch	2.411764706	0.832821031	3	3	0.195703348	0.197826886
Indwelling Catheter	3.85	0.732421107	4	4	0.172110522	0.167355941
Pad or Bag	4.918032787	0.276591273	5	5	0.064995763	0.072420555

All nurse responses when asked to rank each of the methods of urine collection from 1-5, with 1 being the most likely to produce a 'clean' urine sample, and 5 being the least likely to produce a 'clean' urine sample.

### Doctors

Data from the 6 Doctors who completed the survey in the collection period are available upon request.