Summer 8-7-2018

Promoting Adherence to Best Practice Related to Urine Reflex to Culture Testing

Maykel Verdecia Alonso BA,RN-CPHN
maykel.alonso@hcahealthcare.com

Recommended Citation

Centers for Disease Control and Prevention. (2018a). Identifying healthcare-associated infections (HAI) for NHSN surveillance. In National Healthcare Safety Network (NHSN) patient safety component manual (Chapter 2). Retrieved from https://www.cdc.gov/nhsn/pdfs/pscmanual/2psc_identifyinghais_nhsncurrent.pdf Centers for Disease Control and Prevention. (2018b). Urinary tract infection (catheter-associated urinary tract infection [CAUTI] and non-catheter-associated urinary tract infection [UTI]) and other urinary system infection (USI) events. In National Healthcare Safety Network (NHSN) patient safety component manual (Ch. 7). Retrieved from https://www.cdc.gov/nhsn/PDFs/pscManual/7pscCAUTIcurrent.pdf Colgan, R., Nicolle, L. E., McGlone, A., & Hooton, T. M. (2006). Asymptomatic bacteriuria in adults. American Family Physician, 74(6), 985-990. Retrieved from https://www.aafp.org/afp/2006/0915/p985.pdf Epstein, L., Edwards, J. R., Halpin, A. L., Preas, M. A., Blythe, D., Harris, A. D., … Leekha, S. (2016). Evaluation of a novel intervention to reduce unnecessary urine cultures in intensive care units at a tertiary care hospital in Maryland, 2011-2014. Infection Control & Hospital Epidemiology, 37(5), 606-609. doi:10.1017/ice.2016.9 Garcia, R., & Spitzer, E. D. (2017). Promoting appropriate urine culture management to improve healthcare outcomes and the accuracy of catheter-associated urinary tract infections. American Journal of Infection Control, 45(10), 1143-1153. Hutchings, F., & Jadresić, L. (2010). GPs should evaluate all children following an UTI. Practitioner, 254(1731), 17-19, 21. Imade, P. E., Izekor, P. E., Eghafona, N. O.,

Promoting Adherence to Best Practice Related to Urine Reflex to Culture Testing

Maykel Verdecia Alonso

University of San Francisco

Committee Members: Infection Control

July 2018

Acknowledgments

I would like to thank Prof. Cathy Coleman, for her guidance and support. Her encouragement and guidance have helped me accomplish a Master Degree in the Nursing – Clinical Nursing Leadership program at University of San Francisco.

Special gratitude goes to my colleague and classmate Ginger Miramontes for her dual commitment to my completion of the educational program.

Thank you to the facility's Quality Department, Microbiology Department and the clinicians for providing the resources needed, which allowed me to undertake this project.

Abstract

Over a two week period, the infection control nurse, from a trauma designated facility located in norther California, planned a practice improvement project in collaboration with the laboratory microsystem to educate referring physicians and increase adherence to the Centers for Disease Control (CDC) protocol, which delineates recommended best practices related to urine reflex to culture testing. Urinalysis (UA) is a test that triggers a reflex urine culture when pyuria is present. Frequent urine culturing without the presence of pyuria can cause unnecessary treatment with antimicrobials. From January 2017 to December 2017, 10% of UAs from 200 urine samples from asymptomatic patients yielded the presence of a microorganism, necessitating antimicrobial treatment. A single center study applied a best practice and used a reflex urine culture protocol that prompted the laboratory staff to perform a UA followed by a urine culture if pyuria (WBC >10/HPF) was present. Currently, the facility's laboratory uses WBC >5/HPF as a criterion. To gain physician support over a 2-week period, 25 physicians were educated using a flowchart that defines the new clinical and pyuria criteria (Appendix A). The long-term goal is to ensure that the number of urine cultures triggered by the new pyuria value aligns with Urinary Tract Infection (UTI) symptomatology, which consequently reduce unnecessary antimicrobial treatment. The project resulted in referring physicians' engagement and adoption of the CDC protocol and agreement to monitor the number of reflex urine tests prospectively and analyze patterns that triggered treatment with antimicrobials of asymptomatic patients over a six month period.

Keywords: pyuria, CDC, urine reflex to culture testing, urinalysis, Urinary Tract Infection, antimicrobial

Problem description

Frequent urine reflex to culture testing may increase the detection of bacteriuria and lead to potential overtreatment with antimicrobial in asymptomatic patients (Epstein et al., 2016). Urine reflex to culture testing is a modified laboratory ordering process that allows identification of an organism by culture after a urinalysis (UA) is performed. First, for a UA to trigger a culture testing, the UA must be found to be positive for specific test parameters, including pyuria (negative leukocyte esterase and a WBC count). A single center study by Epstein et al. (2016) used a urine reflex to culture testing protocol that prompted the laboratory staff to perform a urine culture if pyuria was present in the UA; pyuria is defined at white blood cells more than 10/HPF (white blood cells per high power field) (Paulus, 2016). Currently, the facility's laboratory uses 5/HPF as a criterion. The purpose of this project is to use evidence based practice to align the 264-bed acute care, trauma II-designated facility located in Northern California- San Jose NC-SJ pyuria criterion from >5 HPF to >10 HPF. However, the presence of pyuria in the urine by itself does not necessarily mean that the patient has a urinary tract infection; the patient needs to have clinical evidence of an UTI, as defined by CDC. The short term goal of this project is to gain support and educate referring physicians about to the Centers for Disease Control (CDC) protocol, which clearly delineates the clinical manifestation of a Symptomatic Urinary Tract Infection (SUTI). Frequent urine culturing without the presence of pyuria and clinical manifestations of an UTI has been attributed to unnecessary treatment with antimicrobials of asymptomatic patients.

Available knowledge

The Centers for Disease Control (CDC, 2018 b) recommends that certain group of patients, which will be later identified, must present with signs and symptoms of an UTI, in addition to the presence of pyuria in the urine. The most classical signs and symptoms of an UTI are fever, flank pain, and abdominal tenderness. Fever is defined as a body temperature of >100.4 ºF or >38 ºC. If the patient has an indwelling urinary catheter (Foley), dysuria, urgency, and frequency cannot be used to meet a Symptomatic Urinary Tract Infection (SUTI) criterion; an indwelling urinary catheter in place could cause patient to complaint the presence of these symptoms (CDC, 2018 b).

Frequent urine culturing without the presence of pyuria and appropriate clinical indications can cause over diagnosis and treatment with antimicrobials on asymptomatic patients (Garcia & Spitzer, 2017). The role of the Infection Control nurse as a clinical nurse leader in the mesosystem, is to utilize evidence-based practice to gain support and educate referring physicians to collect specimens on patients who meet SUTI criteria as defined by the CDC (Appendix A). Thus, within the scope of this project, the Infection Control nurse will educate physicians to adhere to the urine reflex to culture testing, using pyuria >10/HPF, in the laboratory microsystem within two weeks, which leads to the reduction of unnecessary culture testing and potential overtreatment with antimicrobial on asymptomatic patients.

Literature research

To define the clinical manifestations of an UTI, research articles from EBSCOhost database were reviewed and analyzed. A retrospective study evaluating febrile catheterized trauma patients finds that UAs, defined as positive leukocyte esterase and nitrite and WBC >10/HPF, have a negative predictive value of 100%, positive predictive value 15.5%, sensitivity 100%, and specificity 65.1% for an UTI (Tambyah, 2016). This study confirms that fever is a valid criterion to be used to identify the presence of an UTI in the presence of an indwelling catheter, and that pyuria >10/HPF can be a trigger criterion for urine reflex to culture testing.

The CDC (2018b) defines an UTI as the presence of dysuria, urgency, and frequency. These symptoms are not considered clinical evidence of an UTI when there is a presence of an indwelling urinary catheter (Foley). A presence of an indwelling urinary catheter could cause patients to complaint dysuria, urgency, and frequency without necessarily be correlated to the presence of an UTI. On another hand, flank pain and abdominal tenderness continues to be considered classical signs and symptoms of an UTI, as defined by the CDC (2018b).

The UTI symptomatology described above, does not manifests the same in specific group population. Hutchings and Jadresic (2010), from the Department of Pediatrics, Gloucestershire Royal Hospital, argued "General Practitioners should evaluate all children following an UTI" and that 10% of girls and 3% of boys will have had an UTI by 16 years of age. The majority of an UTI are acute, isolated illnesses that resolve quickly, with no long-term implications for the patient. This study corroborates that an UTI can manifests also with presence of vomiting, alter mental status, a failure to thrive, in the pediatric population. Because of this finding, the pediatric population is excluded from this project. This population will bypass the Urine Reflex to Culture Testing Criteria (see appendix A); the urine collection will continue to go straight to

culture without the need of a urinalysis, as it is currently performed at NC-SJ (Hutching & Jadresic, 2010).

The Mayo Clinic also used a list of appropriate indications to identify the need for a urine culture. Smelly and cloudy urine are unreliable indicators of an UTI and should not trigger urine collection in general (Sampathkumar et al., 2016).

Pregnancy was also excluded from the urine reflex to culture testing criteria. In pregnancy, the apparent reduction in immunity on a pregnant women tends to encourage the growth of microorganisms (Imade, Izekor, Eghafona, Enabulele, & Ophori, 2010).

PICO statement

Patient and Problem: Asymptomatic Urinary Tract Infection patients with bacteriuria (WBC>5 HPF) whose reflex culture yielded to the presence of a microorganism, necessitating antimicrobial treatment.

Intervention: Over a two weeks period, the infection control nurse, from a trauma designated facility located in norther California, planned a practice improvement project in collaboration with the laboratory microsystem to educate referring physicians to adhere to the Centers for Disease Control (CDC) protocol, which delineates the clinical manifestation of a Symptomatic Urinary Tract Infection (SUTI) and to recommend best practices related to urine reflex to culture testing using pyuria (WBC= >10/HPF).

Comparison: Baseline data collected between January 2017 to December 2017 represented that 10% of 200 urine samples from asymptomatic patients, whose UAs (negative leukocyte esterase and a WBC count >5 HPF) reflex to culture, and which culture yielded to the presence of a microorganism, necessitating unnecessary antimicrobial treatment. The goal of this project is to update the pyuria criterion using best evidence practices (WBC>10/HPF) and in 6 months period use the collected data for comparison to determine physician adherence to the Centers for Disease Control (CDC) protocol, which delineates recommended best practices related to urine reflex to culture testing on symptomatic patients. With the purpose to determine if asymptomatic patients continue to be ruled-out for UTI without the presence of sings or symptoms of UTI, which lead to unnecessary treatment with antimicrobials.

Outcome: To gain physician support, over a 2-week period, 25 physicians are educated using a flowchart (see appendix A) that defines UTI and outline the new pyuria criteria (>10/HPF). The long-term goal is to ensure that the number of urine cultures are triggered only

by UAs that meet pyuria criteria (WBC>10/HPF), with an expected reduction of unnecessary culture testing on asymptomatic patients, and the reduction of unnecessary antimicrobial treatments.

Specific aim

This project aim to gain support and to educate referring physicians about current CDC protocol over a 2-week period, which recommends urine reflex to culture testing when pyuria (WBC >10/HPF) is present on patients who meet SUTI criteria (Appendix A). The long-term goal of this paper is to ensure that the number of urine cultures triggered by the new urine reflex to culture testing protocol is appropriate. Leading to an expected reduction of unnecessary urine culture testing and a reduction of unnecessary antimicrobial treatment on asymptomatic patients. The project will be successful if referring physicians adopt the CDC protocol using best evidence practice. The project resulted in referring physicians' engagement and adoption of the CDC protocol and agreement to monitor the number of reflex urine tests prospectively and analyze patterns that triggered treatment with antimicrobials on asymptomatic patients over a six month period.

Methods

Context

The EBSCOhost database is researched for articles related to recommended best practice protocols associated with urine reflex to culture testing in the laboratory microsystem, with the purpose of creating a flowchart, which purpose is intended to educate referring physicians about the defined pyuria criteria and the clinical manifestations of an UTI. All with the purpose of reducing unnecessary culture testing and potential overtreatment of asymptomatic patients.

Intervention theory

Trautner and Grigoryan (2014) created a flowchart that outlines the decision of collecting a urine specimen for urine reflex to culture testing (see Appendix A). The flowchart requires the presence of a catheter-related UTI (CAUTI) as initial criteria for reflex culturing. For the purpose of this paper, the algorithm was adopted and modified taking in consideration that asymptomatic bacteriuria affects all population and is not just limited to those who have an indwelling urinary catheter (Colgan, Nicolle, McGlone, & Hootan, 2006). With the adoption and modification of the flowchart, all patients, with or without the presence of a urinary catheter, will have to have presence of signs and symptoms of an UTI for urine to reflex to culture. Treating asymptomatic bacteriuria in patients with or without indwelling catheters has not been found to improve outcomes (Colgan et al., 2006).

Once an UTI criteria is identified, attention is concentrated on those UAs values that reflex to urine culture testing. An interview that took place at NC-SJ micro laboratory setting on June 3, 2018, revealed that NC-SJ currently uses pyuria criteria of WBC > 5/HPH. This practice improvement project aim to gain support and to educate referring physicians about current CDC

protocol, which recommends urine reflex to culture testing when pyuria (WBC >10/HPF) is present.

By interviewing the microbiology personnel, it was also determined that NC-SJ uses different urine reflex to culture testing criteria depending on the type of physician's order. For example, UAHOLD and UAMIC&HOLD, which are lab pneumonic, are used to order the same urine reflex to culture testing and use different pyuria values, as described in Table 1.

Table 1

Urinalysis to Urine Reflex to Culture Testing Workflow Criteria

Leukocyte Esterase	Nitrite	Bacteria	WBC
POS	POS	NEG	NEG
Small to Large	NEG	NEG – Many	NEG
NEG	POS	NEG – Many	>5/HPF
NEG	NEG	NEG	>10/HPF
NEG	NEG	MOD – Many	>5/HPF

Note. POS= Positive, NEG= Negative, MOD= Moderate
Retrieved from NC-SJ Micro Laboratory Guide. *General Specimen Collection Information on* July 15, 2018.

Using the facility's TheraDoc™ Clinical Surveillance System to Support the Infection Prevention Program, 10% of 200 urine samples from patients with UAs (negative leukocyte esterase and a WBC count >5/HPF) yielded the presence of a possible microorganism, necessitating further evaluation between January 2017 and December 2018. For the purpose of this project, we concentrated our attention to those UAs that have presence of pyuria, and which triggered urine culture testing (negative leukocyte esterase and WBC count >5/HPF). Because the purpose of this paper was to align NC-SJ with the best evidence practices, pyuria criteria was changed from >5 HPF to >10 HPF. The newly updated Urinalysis to Urine Reflex to Culture Testing Workflow Criteria is shown in Table 2.

NC-SJ has a third pneumonic that is used when an UA is not used as a criteria for reflex to culture (UR CX). By using the pneumonic UR CX, physicians have the right to bypass an UA meaning that all urine specimens will go directly to a urine culture when it is clinically indicated.

To ensure that physicians use the proper criteria/pneumonic for urine collection, within a 2-week period, the hospitalist and intensivist group are educated using a new flowchart that defines the new urine reflex to culture testing (see Appendix A).

The Mayo Clinic used a list of appropriate indications to identify the need for a direct urine culture without the need of an UA. They consider fever, following a urologic surgery, neutropenic fever, septic shock, and new spike of fever in patients with chronic catheterization to be susceptible individuals; straight to culture urine testing is recommended (Sampathkumar et al., 2016). For this project, patients who meet these diagnoses are excluded from the new flowchart that defines the new urine reflex to culture testing criteria, and their urine culture will go directly to a urine culture by using the pneumonic UR CX.

To implement this new standardized procedure, the microbiology team leader, with assistance of the manager of the laboratory, the Infection Control Department, and previously identified laboratory unit champions, will an utilize a pocket guide for handoff across multiple shifts to assist with introducing the new pyuria criteria (WBC > 10/HPF) at the microsystem level (see Table 2). The purpose of the use this pocket guide will be described later in this paper. The project specifics are listed as outline (Appendix B).

Table 2

Urine Reflex to Culture Testing Updated Workflow Criteria

Leukocyte Esterase	Nitrite	Bacteria	WBC
POS	POS	NEG	NEG
Small to Large	NEG	NEG – Many	NEG
NEG	POS	NEG – Many	>10/HPF
NEG	NEG	NEG	>10/HPF
NEG	NEG	MOD – Many	>10/HPF

Note. POS= Positive, NEG= Negative, MOD= Moderate
Retrieved from NC-SJ Micro Laboratory Guide. *General Specimen Collection Information* on July 15, 2018

At the time of performing chart reviews, it was indispensable to have a timeframe reference. For this project, the CDC (2018a) Hospital-Acquired Infection (HAI)-Infection Criteria definition is adopted. The tool adopted from the CDC (see Table 3) is intended to identify the UTI-first element of infection and the Infection Window period. The UTI-first element of infection is the date the patient first presented with signs and symptoms of an UTI. The infection Window, correlates with the seven calendar days, the three calendar days before and the three calendar days after the first element is used to diagnose the UTI criteria (urine culture, pyuria, flank pain, fever, abdominal tenderness, etc.). See Appendix A for the list of elements/criteria use to define UTI.

Table 3

Urinary Tract Infection Criteria- Infection Window

Infection Window Period	
Day 1	Three days before positive culture
Day 2	
Day 3	
Date of first positive test that is used as an element of the urine positive micro	
Day 5	Three days after positive culture
Day 6	
Day 7	

Retrieved from Centers for Disease Control and Prevention. (2018b). Urinary tract infection (catheter-associated urinary tract infection [CAUTI] and non-catheter-associated urinary tract infection [an UTI]) and other urinary system infection (USI) events. *NHSN*. Chapter 7.

Change model

Organizational theories have served as the roots of how organizations are designed and managed. However, all start at a microsystem level, where day-to-day operations are impacted by people's activities and microsystem's culture. Because of the implication of a change on practice in the micro-laboratory-microsystem, the Clinical Nurse Leader (CNL) became the change agent who brings this change up to the members of the team, using Lewin's Three-Step Model for Change. The CNL focused on using the new pyuria-defined criteria, as defined in Table 2 (change), which differs from previous practice. Passed practice for urine reflex to culture testing used a WBC count >5/HPF (unfreeze – Lewin's theory).

The use of a pocket guide using updated pyuria criteria for handoff across multiple shifts and the participation of various disciplines (Infection Control, Leadership, Physicians, and Micro Personnel) demonstrates the ability of numerous disciplines to foster an environment of change by utilizing the Lewin's theory framework for leading and sustaining change. After the change, the capability to adapt to the new process and the capacity to have a collective agreement among disciplines (freeze) will also manifest the organization's ability to sustain these changes.

Study of the intervention

Over a two weeks period, the infection control nurse acting as CNL, implemented a practice improvement project in collaboration with the laboratory microsystem to educate referring physicians and increase adherence to the Centers for Disease Control (CDC) protocol, which recommends best practices related to urine reflex to culture testing on patients who meet UTI clinical criteria. 25 physicians were educated using a flowchart that outlines the decision of collecting a urine specimen for urine reflex to culture testing (see Appendix A). The flowchart

requires the presence of an UTI related symptoms, which will qualify the specimen for a UA. If the UA meets pyuria criteria, the urine will trigger a reflex to culture testing.

The reflex urine culture protocol that prompted the laboratory staff to perform a UA followed by a urine culture if pyuria was present was updated, reflecting the new pyuria criteria of WBC>10/HPF. The new proposed protocol was presented to the Infection Control Committee and the Laboratory Director. The draft protocol is scheduled to be presented in the facility's Board of Director for final approval. Once approval, the new proposed change will substitute the Urine Reflex to Culture Testing Updated Workflow Criteria listed in the NC-SJ-Micro Laboratory Guide under General Specimen Collection Information.

Because of the time constraint of this project, it was not feasible to evaluate adherence to this process improvement. Therefore, the recommendation is to monitor the number of UAs performed on asymptomatic patients in 6 months from the date this project is implemented. The expected outcome is to observe a reduction of UAs testing on asymptomatic patients with consequent reduction of antimicrobial treatment.

Ethical consideration

This project meets the guidelines for an evidence-based change in practice project as outlined in the University of San Francisco Letter of Determination and it is excluded from the Institutional Review Board (IRB); the project does not intend to research human subjects.

Results

Consensus was obtained among 25 referring physicians to pilot the new protocol and improve communication and collaboration between the micro laboratory microsystem. To gain physician support over a 2-week period, 25 physicians were educated using a flowchart that defines the new clinical and pyuria criteria (Appendix A). The long-term goal is to ensure that the number of urine cultures triggered by the new pyuria value aligns with Urinary Tract Infection (UTI) symptomatology, which consequently reduce unnecessary antimicrobial treatment. The project resulted in referring physicians' engagement and adoption of the CDC protocol and agreement to monitor the number of reflex urine tests prospectively and analyze patterns that triggered treatment with antimicrobials of asymptomatic patients over a six month period.

Developed and pilot tested a pocket sized reminder for Urine Reflex to Culture Testing Updated Workflow Criteria. During the implementation of the Urine Reflex to Culture Testing Protocol, the CNL utilizes a micro-laboratory pocket guide to outline the new process extracting data from the micro-laboratory Specimen Collection Guide (see appendix E). The CNL and the laboratory team will utilize a pocket guide for handoff across multiple shifts to assist with introducing the new criteria (pyuria > 10 HPF) at the microsystem level, fostering a learning environment across the organization (see Table 2).

Created and pilot tested a Reflex to Culture Testing Data Collection Tool for prospective tracking and monitoring of UTI. The tool is used to evaluate the number of asymptomatic patients with UAs, defined as positive leukocyte esterase and nitrite and WBC <10/HPF, whose urine culture trigger unnecessary antimicrobial treatment.

Discussion

Limitations

Even though Symptomatic Urinary Tract Infection (SUTI) is well defined in the literature, accurately measurement of the incidence of this type of infection in the community is challenging because the criteria used to diagnose it are not consistent across epidemiologic studies. For example, in a trauma population, large quantity of patients will not be able to complaint the presence of flank pain, dysuria, urgency, or frequency, especially if they are intubated or have neurological impairment. These symptoms are subjective and are only found when the patient has the sensation of discomfort, in specific body part; flank pain refers to discomfort in the body area below the rib and above the ilium.

Despite the fact that an UTI has a large amount of codes assigned by the International Classification of Diseases, Tenth Edition (ICD-10), which makes the gathering of the data difficult and extensive.

Obtaining ICD-10 codes are obtained from the MD office or coding, which does not bypass the opportunity of human error.

Other information

Clinical Nurse Leader Role

The role of a CNL is to collaborate with healthcare professionals, including physicians, nurse managers, and micro laboratory personnel, to plan, implement and evaluate an improvement opportunity (AACN, 2013). With this being, a change in workflow in the micro lab microsystem, the normal resistance to change offer challenges to implement the program. The CNL studies the role of each of the members of the multidisciplinary team to achieve success. Taking in consideration the facility meso and macro system structure to ensure that the project aligns with the facility approval process and follows the proper chain of command.

During the implementation of the Urine Reflex to Culture Testing Protocol, the CNL utilizes a micro-laboratory pocket guide to outline the new process extracting data from the micro-laboratory Specimen Collection Guide (see appendix E). The CNL and the laboratory team will utilize a pocket guide for handoff across multiple shifts to assist with introducing the new criteria (pyuria > 10 HPF) at the microsystem level, fostering a learning environment across the organization. This demonstrate CNL role of educator.

References

Centers for Disease Control and Prevention. (2018a). Identifying healthcare-associated infections (HAI) for NHSN surveillance. In *National Healthcare Safety Network (NHSN) patient safety component manual* (Chapter 2). Retrieved from https://www.cdc.gov/nhsn/pdfs/pscmanual/2psc_identifyinghais_nhsncurrent.pdf

Centers for Disease Control and Prevention. (2018b). Urinary tract infection (catheter-associated urinary tract infection [CAUTI] and non-catheter-associated urinary tract infection [UTI]) and other urinary system infection (USI) events. In *National Healthcare Safety Network (NHSN) patient safety component manual* (Ch. 7). Retrieved from https://www.cdc.gov/nhsn/PDFs/pscManual/7pscCAUTIcurrent.pdf

Colgan, R., Nicolle, L. E., McGlone, A., & Hooton, T. M. (2006). Asymptomatic bacteriuria in adults. *American Family Physician, 74*(6), 985-990. Retrieved from https://www.aafp.org/afp/2006/0915/p985.pdf

Epstein, L., Edwards, J. R., Halpin, A. L., Preas, M. A., Blythe, D., Harris, A. D., … Leekha, S. (2016). Evaluation of a novel intervention to reduce unnecessary urine cultures in intensive care units at a tertiary care hospital in Maryland, 2011-2014. *Infection Control & Hospital Epidemiology, 37*(5), 606-609. doi:10.1017/ice.2016.9

Garcia, R., & Spitzer, E. D. (2017). Promoting appropriate urine culture management to improve healthcare outcomes and the accuracy of catheter-associated urinary tract infections. *American Journal of Infection Control, 45*(10), 1143-1153.

Hutchings, F., & Jadresić, L. (2010). GPs should evaluate all children following an UTI. *Practitioner, 254*(1731), 17-19, 21.

Imade, P. E., Izekor, P. E., Eghafona, N. O., Enabulele, O. I., & Ophori, E. (2010). Asymptomatic bacteriuria among pregnant women. *North American Journal of Medical Sciences, 2*(6), 263-266. doi:10.4297/najms.2010.2263

Ott, Karen M., Haase-Herrick, Karen., Harris, James. (2016). American Association of Colleges of Nursing Working Statement Comparing the Clinical Nurse Leaders and Nurse Manager Roles: Similarities, Differences and Complementarities. Retrieved from http://www.aacnnursing.org/Portals/42/CNL/CNL-Manager-Roles.pdf

Paulus, C., White, W., Silkaitis C, Mikolajczak, A., Johnson, A., Keck, A., … Young, C. (2016). *The impact of urinalysis reflex criteria on surveillance catheter-associated urinary tract infections*. Retrieved from https://idsa.confex.com/idsa/2016/webprogram/Paper58815.html

Rushing, M., Cracolici, V., Shibib, D., Tesic, V., Charnot-Katsikas, A., & Beavis, K. (2017). Urine cultures based on a reflex testing algorithm an utilizing urinalysis results may result in missed diagnostic opportunities. *American Journal of Clinical Pathology, 147*(s2), s179. doi:10.1093/ajcp/aqw191.058

Sampathkumar, P., Barth, J. W., Johnson, M., Marosek, N., Worden, W., Dhanorker, S., … Thompson, R. (2016). Mayo Clinic reduces catheter-associated urinary tract infections through a bundled 6-C approach. *Joint Commission Journal on Quality and Patient Safety, 42*(6): 254-261.

Tambyah, P.A., Maki D. (2000). The relationship between pyuria and infection in patients with indwelling urinary catheters. *Archives of Internal Medicine*;*160*: 673-77.

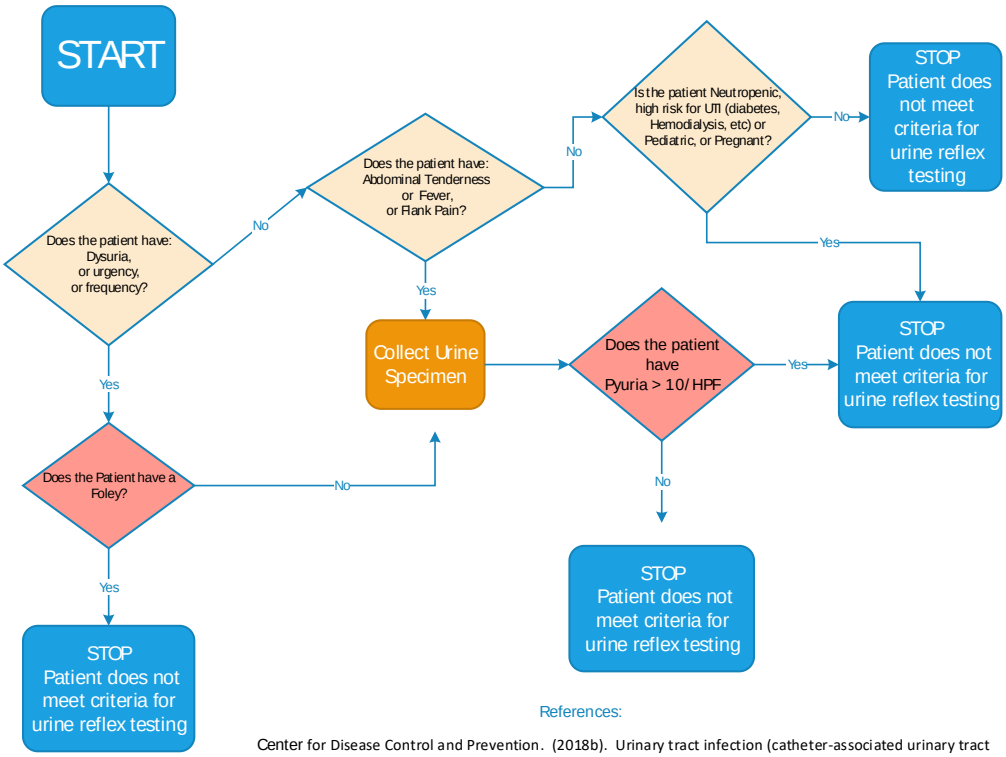
Trautner, B. W., & Grigoryan, L. (2014). Approach to a positive urine culture in a patient without urinary symptoms. *Infectious Disease Clinics of North America, 28* (1), 15-31. doi:10.1016/j.idc.2013.09.005

Appendices

Appendix A.

Criteria for Urine Reflex to Culture Testing Flowchart

Appendix # 1: Flowchart-Reference for Physicians- Criteria for Urine Reflex Testing.



References:

Center for Disease Control and Prevention. (2018b). Urinary tract infection (catheter-associated urinary tract infection [CAUTI] and non-catheter-associated urinary tract infection [UTI]) and other urinary system infection (USI) events. In *National Healthcare Safety Network (NHSN) patient safety component manual* (Chapter 7). Retrieved from https://www.cdc.gov/nhsn/PDFs/pscManual/7pscCAUTIcurrent.pdf

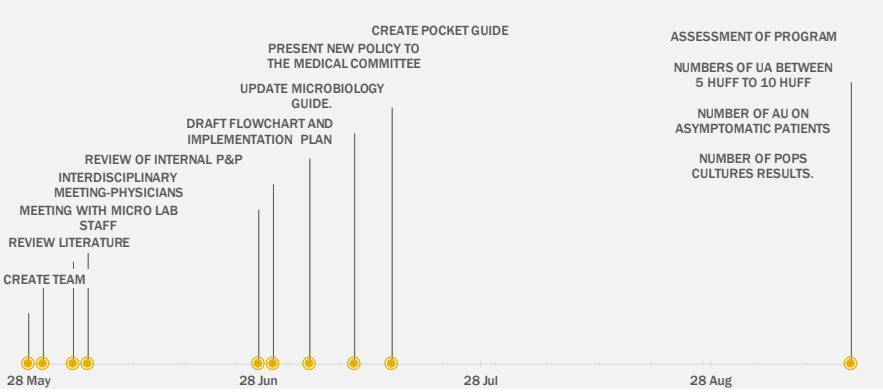
Paulus, C., White, W., Silkaitis C, Mikolajczak, A., Johnson, A., Keck, A., … Young, C. (2016). *The impact of urinalysis reflex criteria on surveillance catheter-associated urinary tract infections*. Retrieved from https://idsa.confex.com/idsa/2016/webprogram/Paper58815.html

Created by:
Maykel Alonso BA, BSN-RN 07/15/2018

Appendix B.

Project Timeline

PROJECT TIMELINE

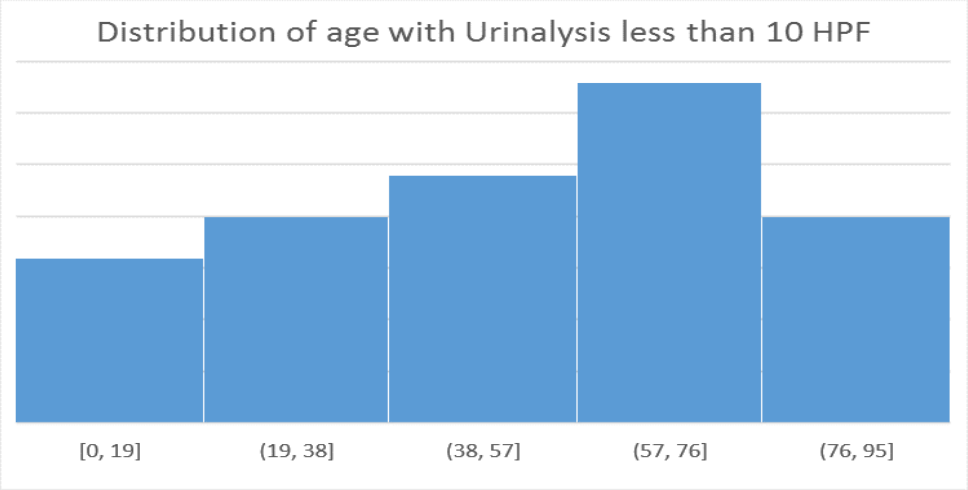


PROJECT DETAILS

DATE	MILESTONE	Milestone adjusted	Completion Date
26-May	Collect data	Number of Urine Specimens Collected between 5 HPF to 10 HPF, which reflex to culture, and had a positive micro	5-Jun
28-May	Create team	microbiology team leader, with assistance of the manager of the laboratory, the Infection Control Department and previously identified laboratory unit champions	7-Jun
30-May	Review literature	Review of EBSCOhost, CDC, APIC references	9-Jun
3-Jun	Meeting with Micro Lab staff	Interview with Micro Lab personnel to go over the current UA reflex testing	13-Jun
5-Jun	Review of internal P&P	Review of Microbiology Guide-Protocol	15-Jun
28-Jun	Draft flowchart and implementation plan	Draft flowchart and implementation plan	8-Jul
30-Jun	Interdisciplinary Meeting-physicians	Meet with Interdisciplinary- hospital physicians to obtain their buy-in. Approval will be obtained by vote. Voting result to be documented in the minutes.	10-Jul
5-Jul	Update microbiology guide.	Update current microbiology guideline.	15-Jul
11-Jul	Present new policy to the medical committee	Present new policy to the medical committee after the update - and to the administrative group- during management meeting- obtain approval by voting	21-Jul
16-Jul	Create pocket guide	Create and laminate pocket guide to be used as a tool to remind micro lab about the new changes.	26-Jul
16-Sep	Assessment of program	Assessment of program by utilizing the assessment tool to evaluate adherence to the new implemented process.	26-Sep

Appendix C.

Distribution of population by age with urinalysis less than 10/HPH.



Data retrieved from NC-SJ facility's TheraDoc™ Clinical Surveillance System to Support Infection Prevention Program on July 15, 2018.

Appendix D.

Urine Reflex to Culture Testing Data Collection Tool

Urine Reflexing Testing - Data Collection Tool

PROJECT DETAILS

URINE COLLECTION IDENTIFIER	INFECTION WINDOW			Foley	SYMTOMS						Risk Factors	Pyuria	Culture	Antimicrobial
	DATE OF URINE COLLECTION (DATE OF EVENT)	Infection Period FROM (3 calendar days BEFORE the date of event (urine culture)	Infection Period UP TO (3 calendar days AFTER the date of event (urine culture) 2		FEVER >100.4°F or >38°C.	FLANK PAIN	ABDOMINAL TENDERNESS	DYSURIA	URGENCY	FREQUENCY				
EXAMPLE	14-Jul	7/11/2018	7/15/2018											

Created by Maykel V. Alonso July 15, 2018

Appendix E.

NC-SJ -Micro Laboratory Guide

GENERAL SPECIMEN COLLECTION INFORMATION

SPECIMEN LABELING REQUIREMENTS

(Applies to all specimens collected, not limited to Microbiology)

The Clinical Laboratory strives to maintain the highest quality standards for health care. We are required by the College of American Pathologists, California State Department of Public Health, and Joint Commission on Accreditation of Healthcare Organizations, and other regulatory agencies, to ensure proper specimen collection, labeling, and transport. These elements are essential in producing accurate laboratory results.

Unlabeled or improperly labeled specimens will not be accepted. The Laboratory requires that all samples be labeled correctly by the staff member collecting the specimen, or, another specimen must be collected from the patient. Unlabeled or mislabeled specimens will trigger an Incident report from the Laboratory.

Each specimen must have all of the following information on the actual container or tube (not on the lid or bag):

1. Full name (first and last)
2. Medical Record Number (ID Number or Social Security Number)
3. Date specimen collected
4. Time specimen collected
5. Initials of the person obtaining a specimen
6. Specify source/site of all specimens, including those for Microbiology culture. (Example: abdominal wound, pelvic abscess, CSF, synovial fluid, Rt. knee, etc.).

In addition to these requirements, it is suggested that all tests requested be listed on the label (Example: protein, glucose, gram stain, culture). This is to insure that all tests desired have computer orders and are performed.

MICROBIOLOGY SPECIMEN ACCEPTABILITY

For a specimen to be acceptable for microbiological evaluation, it must not only be collected properly, but it must also be transported to the Laboratory immediately. If these are not done, the data derived from the culture may be misleading or erroneous. If containers are used for collection, these must be tightly sealed to prevent leakage and spills. All specimens must be placed in a biohazard labeled plastic bag for transport.

Criteria for rejection of unacceptable Microbiology specimens:

1. Specimen not labeled or mislabeled
2. Requisition data and specimen data do not correlate
3. Non-sterile container
4. Grossly contaminated specimen
5. Dried out specimen
6. Swab not in contact with the sponge-transport medium
7. Inadequate amount of specimen
8. Inappropriate specimen
9. Unsatisfactorily preserved or too old a specimen
10. Inappropriate holding medium

UNACCEPTABLE SPECIMEN POLICY:

1. When an unacceptable specimen is received, the laboratory will notify the physician or charge nurse as to why the specimen is unacceptable for culture.
2. The Laboratory will ask that a new, acceptable specimen be sent to the Laboratory.
3. If the unacceptable specimen is of a critical nature or such that another specimen cannot be obtained or obtained only with great difficulty, such as a body fluid or tissue, the specimen will be processed. The physician will be apprised of the inadequacy of the specimen.
4. If the ordering physician insists that an unsuitable specimen be processed, it will be processed.
5. In no event will the specimen be discarded without the approval of the physician or charge nurse. The specimen will be held until the matter is closed.
6. All communications relating to unacceptable specimens will be documented with dates, times, nature of the incident, and the individuals involved.
7. Any questions that may arise concerning the processing of unacceptable specimens should be taken up with the Microbiology supervisor or a pathologist.

UNLABELED AND MISLABELED SPECIMEN POLICY

1. Only under exceptional circumstances will an unlabeled or mislabeled Specimen be cultured. For example, a body fluid or tissue where it may be extremely difficult or impossible to collect another specimen. Otherwise, a new properly labeled specimen must be submitted.

2. The unlabeled or mislabeled specimens must be identified by the an individual who was directly involved with the collection and handling of the specimen.

3. All unlabeled or mislabeled specimens which are cultured will be documented as follows:

   Mislabeled/unlabeled specimen identified and properly labeled by_____.

Continue next page:

COLLECTION AND TRANSPORT OF CLINICAL MICROBIOLOGY SPECIMENS

COLLECTION OF SPECIMEN:

1. Whenever possible, specimens should be obtained before antibiotics, or other antimicrobial agents have been administered.

2. The material should be collected where the suspected organism is most likely to be found, and with as little external contamination as possible.

3. Specimens should be of a quantity sufficient to permit complete examination and should be placed in sterile containers that preclude subsequent contamination of patient, nurse, or messenger/courier.

4. Provision should be made for the prompt delivery of specimens to the Laboratory if subsequent results of the analysis are to have etiological validity.

5. Date and time of specimen collection and initials of person collecting the specimen must be recorded on the specimen label and the computer ordering screen.

6. Source of the specimen (tissue, urine, sputum, etc.) must be specified on the specimen label and the computer ordering screen.

7. The specific site of the specimen must be specified on the specimen label and computer ordering screen. (eg. Knee, right).

URINE CULTURES

SPECIMEN

Container - Urine specimens must be submitted in a sterile container for culture.

If the urine specimen is collected in a sterile container, a single specimen is satisfactory for both urine culture and urinalysis.

Volume - One-half milliliter is the minimum volume for a urine culture or 10 ml if urinalysis is also included.

Stability - Urine specimens for culture must be processed within one hour after collection unless immediately refrigerated (stable for 24 hours under refrigeration).

Description - Specific collection technique must be stated; for example "cv urine," cath urine," or "left ureter urine."

COLLECTION

Urine specimens for culture must be collected in a manner to minimize contamination of the sample; for example, by catheterization or by clean catch technique.

Clean catch technique:

The periurethral area (tip of the penis, labial fold, vulva) is carefully cleansed with soap and water and well rinsed with clean water to remove the soap with the prepuce or labial folds retracted. The urethra is flushed by the passage of the first portion of voiding which is discarded. The subsequent midstream urine voided directly into a sterile specimen container, is used for culture.

HOLD URINE (for possible culture)

Urine specimens will be held for possible culture if stated as "hold for possible culture" or "urine culture if indicated."

The following criteria must also be met:

1. Equal to or greater than 5 WBC's/HPF with positive nitrite or moderate-many bacteria.
2. Equal to or greater than 10 WBC's/HPF regardless of other results.
3. Leukocyte esterase and nitrite positive.

The physician can also specify criteria for performing a urine culture.

Retrieved from NC-SJ - Micro Laboratory Guide, Hospital Policies and Procedures. Internal Document. Reprinted with permission on July 17, 2018.