Edmonton Zone Medicine Quality Council
Partnerships in Action
Strategic Clinical Improvement Committee

Urine screening on stroke rehabilitation inpatients: a quality improvement initiative

Arjun S Ghuman, MD[1]; Pamela Mathura, MBA[2]; Uma Chandran, MD, FRCPC[3]; Jaime C Yu, MD, MEd, FRCPC[1,3]
1. Division of Physical Medicine and Rehabilitation, Department of Medicine, Faculty of Medicine and Dentistry, University of Alberta, Edmonton, AB
2. Edmonton Zone Medicine Quality Council – Strategic Clinical Improvement Committee, Department of Medicine, Faculty of Medicine and Dentistry and Alberta Health Services, Edmonton, AB
3. Site Quality and Safety Committee, Glenrose Rehabilitation Hospital, Alberta Health Services, Edmonton, AB

BACKGROUND

- Numerous studies have identified urinary tract infections (UTIs) to impact between 13.6% - 48.1% stroke patients
- Ifejika-Jones et al. (2013) noticed that symptomatic UTIs in acute cure is an independent predictor of discharge destination with **57% less likely of being discharged home** and **38% less likely to be discharged to a rehabilitation center**
- Due to our current automated order set**, every patient admitted to stroke rehab has urine samples collected and sent to the lab for Urinalysis, C&S**

.

Investigations
- ■ CBC, electrolytes, creatinine
- ■ Urinalysis, urine culture and sensitivity
- ■ EKG
- ☐ If patient on warfarin, next INR due on _____
- ☐ If patient is diabetic, do glucoscans QID

AIM

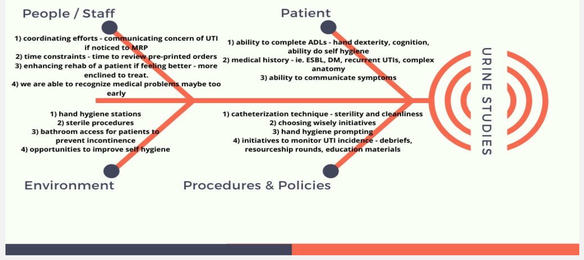
AIM: to reduce unnecessary use of urine studies while ensuring patient outcomes related to urine infections remained optimized and standards of practice in our inpatient program reflect best practice guidelines.

RATIONALE:
1. Clinical practice and **Choosing Wisely Canada** guidelines recommend urine studies only in symptomatic patients
2. Prevent colonization and antimicrobial resistance
3. Avoid over-administering antibiotics and their side effects e.g. C. difficile infections
4. Cost associated with each test

METHODS

1 – Building our understanding	2 – Chart Audit	3 – Intervention development and trial
Literature review Fishbone diagram	No. of patients admitted – age, gender, stroke type	Proposed change – address the automatic order on admission
A pRoject Ethics Community Consensus Initiative (ARECCI) Ethics Screening Tool = 6 Confirm no formal ethics application is required with Research Ethics Board	No. of urine studies sent	Unit clerk to not enter unaddressed orders, notify provider with a sticker
Plan, Do, Study, Act worksheets	Results of studies Number of UTIs treated	Repeat Audit

URINE STUDIES Fishbone Diagram



PDSA #1

Plan: Conduct a baseline chart audit on urine study results of patients admitted to stroke rehabilitation (Unit 3A) over 1 month

Do:

Patient ID	General Stroke Type	Result urinalysis	Result urine C&S	If C&S +, what symptoms	If C&S +, was it treated (yes/no; drug, duration)
1	Pons infarct	test not run	negative		
2	L MCA infarct	1+ Leukocytes	negative		
3	R MCA, Bilateral PCA infarcts	2+ hemoglobin, Leukocytes, Protein	negative		
4	R Lateral Medullary Infarct	neg	negative		
5	L MCA infarct	2+ protein, trace ketone and leukocytes	E. faecium	none	no
6	L MCA infarct	neg	negative		
7	R MCA infarct	neg	negative		
8	Bilateral Pontine Infarcts	3+ leukocytes, 1+ ketones	E. Coli , E. faecalis	none	no
9	R MCA infarct	3+ leukocytes	negative		
10	L Pontine infarct	neg	negative		
11	L Cerebellar Infarct	1+ protein	negative		
12	L Thalamic infarct	1+ hemoglobin	negative		
13	L MCA infarct	1+ leukocytes, trace ketones	negative		
14	L MCA infarct	neg	negative		
15	L Cerebellar Infarct	neg	negative		
16	R Cerebellar Infarct	1+ hemoglobin, 2+ Protein, 3+ Glucose, trace	negative		
17	L Temporoparietal Infarct with hemmorhagic transformation	2+ hemoglobin	negative		
18	R MCA infarct	1+ protein, 3+ hemoglobin and leukocytes	E. faecalis	none	no
19	L MCA infarct	1+ protein, 2+ leukocytes	negative		
20	L Basal Ganglia infarct	neg	negative		
21	R MCA infarct	not done	not done		
22	L Intracranial Hemorrhage	2+ leukocytes, 1+ hemoglobin	negative		
23	R MCA infarct	2+ hemoglobin, trace ketones, leukocytes	negative		
24	L MCA infarct	1+ leukocytes, 2+ protein, 3+ hemoglobin	negative		
25	R Cerebellar and Medullary infarcts	3+ glucose	negative		
26	L Pontine infarct	3+ glucose, 1+ leukocytes	negative		
27	R Corona Radiata infarct	2+ leukocytes	negative		
28	Bilateral PCA infarcts	3+ protein, 1+ glucose	negative		

Study:

- 28 charts audited; 27 patients had urine studies upon admission
- Only 3 showed positive C&S but none with symptoms, and no antimicrobial treatment required
- As per Ma et al. (2019), the Reference Median Cost (from 6 labs in Canada) of a standard urinalysis with microscopy is $10, and urine culture is $15.
- For the 27 patients who had urine studies on admission over that 2-week period, $650 were spent with no clear clinical benefit for the cost

ACT: PDSA #2

Plan:
- Created a brief instructional video and distributed pamphlets with educational material. Video Link: https://youtu.be/PRCW532BJ7k
- Have Physicians / Nurse Practitioners cross out the order on the set → if not, then have the unit clerk put a sticker on the chart and flag for review → have ordering provider check yes or no on sticker.

> The URINE STUDIES were NOT collected. Initial to indicate if you wish to proceed:
> ___ YES ___ NO
> *(Indication?* _____)

- In 4 weeks, repeat the chart audit

Do:

Patient ID	Stroke Type	Were urine studies (US) sent on admission?	result	UTI treated	Were US sent at a later time?	urinalysis	Culture results	UTI treated
1	L MCA Embolic	no	-	-	yes	3-5 RBC	negative	no
2	L PCA	no	-	-	yes	+ WBC, bacteria	not sent	no
3	L MCA	no	-	-	yes	+ WBC, bacteria	10^{4}7 E. Coli	no (retention)
4	L parietal	no	-	-	yes	+ WBC, bacteria	10^{4}7 E. Coli	yes
5	L ACA/MCA Infarct	no	-	July 18	yes	+WBC only	10^{4}7 E. Coli	yes
				June 18	yes	WBC, bacteria, RBC	negative	no
6	L Lacunar Infarct	yes - indwelling Foley	u/a - 25 leuks, 2 ketones Cx - 10^{4}6 mixed growth	no	no	-	-	-
7	L MCA	no	-	-	no	-	-	-
8	L MCA	no	-	-	no	-	-	-
9	L MCA	no	-	-	no	-	-	-
10	L Frontal and Parietal	no	-	-	no	-	-	-
11	R PCA	no	-	-	no	-	-	-
12	R Basal Ganglia ICH	no	-	-	no	-	-	-
13	R medulla	no	-	-	no	-	-	-
14	L pontine infarct	no	-	-	no	-	-	-
15	L cerebellar	no	-	-	no	-	-	-
16	R MCA	no	-	-	no	-	-	-
17	R medulla	no	-	-	no	-	-	-
18	R cerebellar	no	-	-	no	-	-	-
19	L ACA/MCA Infarct	no	-	-	no	-	-	-
20	L Corona Radiata	no	-	-	no	-	-	-
21	R Perforator infarct	no	-	-	no	-	-	-
22	L Cerebellar Infarct	no	-	-	no	-	-	-
23	R MCA infarct	no	-	-	no	-	-	-

Study:
- 23 charts audited; 1 patient had urine studies upon admission
- Estimated cost = $25
- Although positive, the patient was NOT treated for a UTI, and had a long-term indwelling Foley catheter
- Of the 22 patients, 5 had urine studies sent later between 2 – 30 days post admission (the patient who had studies sent on admission was not one of them)
- For the 5 sent, 3 had positive cultures
- 2 patients were treated for a UTI

Act:
- Unit clerks cross out the urine studies as they prepare a new patient's chart
- We plan to advocate for the removal of urine studies upon admission in the EMR- Connect Care's order sets

PROCESS ASSESSMENT

- Outcome Measures:
  - ➢Number of urine studies sent on admission – 1/23 (intentional)
  - ➢Number of orders crossed out – 22/23
  - ➢Number of stickers required to be placed on the chart – 1 (in error: the order had been crossed out)
  - ➢Estimated cost of tests sent ~ $25
- Process Measures:
  - ➢Number of stickers that were missed – none, 1 placed in error
  - ➢Number of meetings held – 2 (Nurse Practitioner and Unit Clerk)
  - ➢Number of views under the YouTube video – 10
  - ➢Number of pamphlets on the unit – 3
- Balancing Measures:
  - ➢Number of UTIs later identified – 2 (9% of our unit over 4 weeks)
  - ➢Number of urine studies needed to be added on after admission – 5 urinalysis, 5 C&S ~ $125

CONCLUSIONS

1. There are risks associated with treatment of asymptomatic bacteriuria. Unnecessary urine studies and antibiotics contribute to unneeded financial expense for the health care system (at admission, ~$650 on 27 inpatients prior vs $25 during our intervention period).
2. Of the 23 stroke rehabilitation inpatients who did NOT have urine screening, 22% (5/23) were investigated for UTI as source of infection at a later point during their admission, and 9% (2/23) were treated for a UTI.

There appears to be no benefit in conducting screening urine studies at the time of admission in stroke rehabilitation inpatients. This practice has been successfully discontinued at our site.

REFERENCES

1. Civelek GM, Atalay A, Turhan N. Medical complications experienced by first-time ischemic stroke patients during inpatient, tertiary level stroke rehabilitation. J Phys Ther Sci. 2016;28(2):382–391. doi:10.1589/jpts.28.382
2. Ovbiagele B, Hills NK, Saver JL, Johnston SC; California Acute Stroke Prototype Registry Investigators. Frequency and determinants of pneumonia and urinary tract infection during stroke hospitalization. J Stroke Cerebrovasc Dis. 2006;15(5):209–213.
3. Ifejika-Jones, Nneka L., et al. "Hospital-acquired symptomatic urinary tract infection in patients admitted to an academic stroke center affects discharge disposition." *PM&R* 5.1 (2013): 9-15.
4. Ma, Irene, et al. "Test volume data for 51 most commonly ordered laboratory tests in Calgary, Alberta, Canada." *Data in brief* 23 (2019): 103748.