Impact and Predictors of Urinalysis Ordering Among General Medicine Patients

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Conflict of Interest

- None

Background

Background

Hypothesis

Methods

Results

Discussion

Conclusion

- Urinalysis (UA) is a rapid screening test commonly used to assess for urinary tract infections (UTIs) among GIM patients

- Excellent negative predictive value[1]

- Positive UA (presence of leukocytes or nitrites) occurs in 45-90% of asymptomatic elderly patients[2,3]

1. Devillé WL et al. *BMC Urology.* 2004;4:4.
2. Nicolle LE. *Infect Dis Clin North Am.* 1997;11(3):647-662.
3. Nicolle LE et al. *Clin Infect Dis.* 2005; 40(5):643-654.

Hypothesis

Overuse of urinalysis in the ED contributes to over-diagnosis and excessive antibiotic use for UTI

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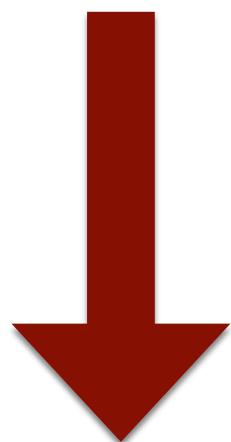HEALTH SCIENCES CENTRE
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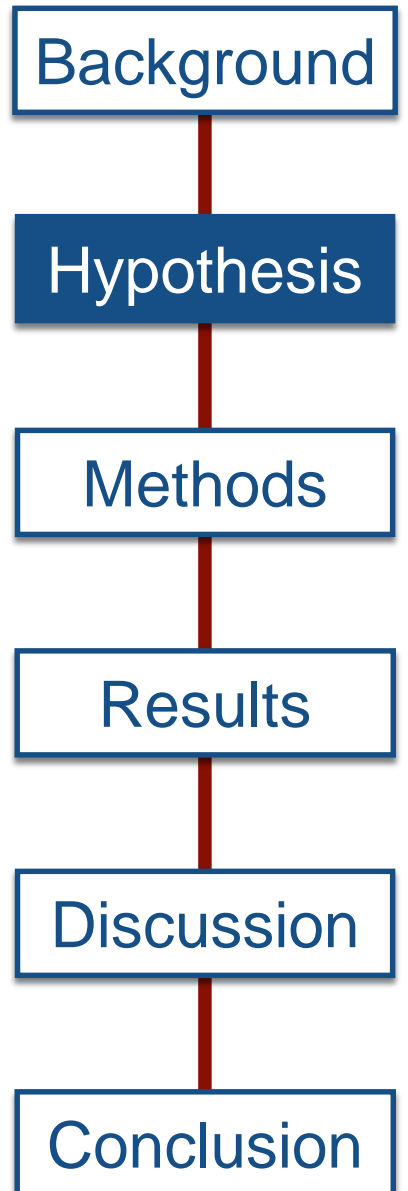
Data Collection

Admission

↓

24 hours

↓

72 hours

Consecutive adult GIM patients admitted from ED (Sept-Oct 2014, Jan 2015)

Symptoms of UTI
1. Dysuria
2. Frequency
3. Suprapubic pain
4. Flank tenderness

- Demographics
- Co-morbidities
- Chief complaint
- Clinical presentation
- Empiric antibiotics?

Acute kidney injury
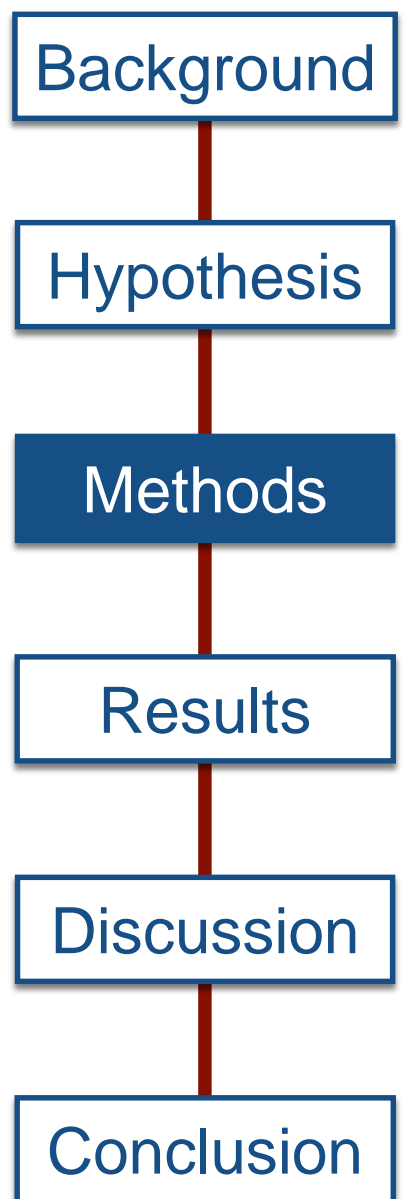- >two-fold rise from baseline serum creatinine

- Urine culture (UC) results
- Changes to antibiotic management based on urine culture results

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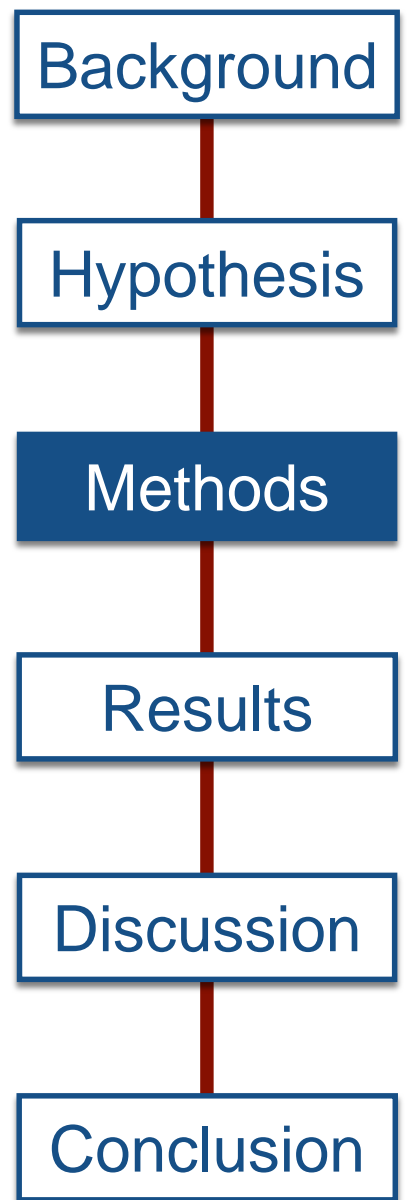
Statistical Analysis

- ## Chi-square analyses:

  - Proportion of patients who underwent UC or antibiotic treatment based on whether their UA was positive or negative

- ## Multivariable logistic regression model:

  - Predictors of UA ordering without indication

    - Advanced age (≥75)

    - Gender

    - Residence in long-term care

    - Diabetes mellitus

    - Dementia

    - Multiple (≥3) comorbidities

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Results

- 403 GIM patients

- 250 (62%) underwent UA on admission

- 211 (84%) lacked UTI symptoms

- 198 (79%) lacked both UTI symptoms and evidence of acute kidney injury
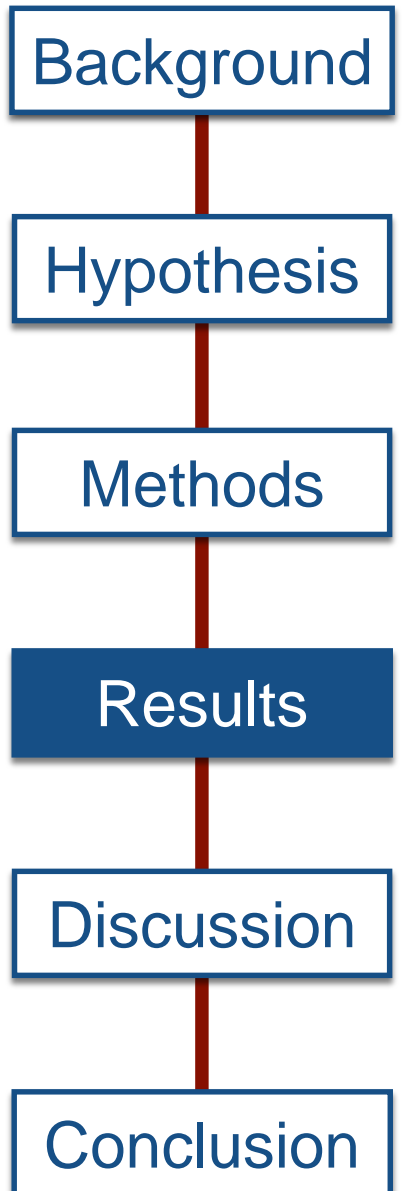
Chief presenting complaint of patients who underwent urinalysis, without meeting guideline based criteria for UTI or AKI (N=198).

Presenting complaint	N (%, 95% Confidence Interval)
Fall, syncope	33 (17, 11.5-21.9)
Fever with documented non-urinary source[A]	28 (14, 9.2-19.0)
Chest pain, dyspnea	27 (14, 8.8-13.8)
Focal infectious symptoms (non-urinary)[B]	23 (12, 7.1-15.9)
Delirium, confusion, altered level of consciousness	18 (9, 5.0-13.0)
Fever without localizing symptoms	16 (8, 4.2-11.8)
Acute neurological problem	16 (8, 4.2-11.8)
Weakness, functional decline	9 (5, 1.6-7.4)
Gastrointestinal bleed	6 (3, 0.6-5.4)
Abdominal pain	6 (3, 0.6-5.4)
Jaundice, ascites	4 (2, 0.0-4.0)
Change in urine colour[C]	4 (2, 0.0-4.0)
Toxins (alcohol withdrawal, overdose)	3 (2, 0.2-3.2)
Miscellaneous[D]	3 (2, 0.2-3.2)
Musculoskletal pain	2 (0.4-2.4)
Total	**198 (100)**
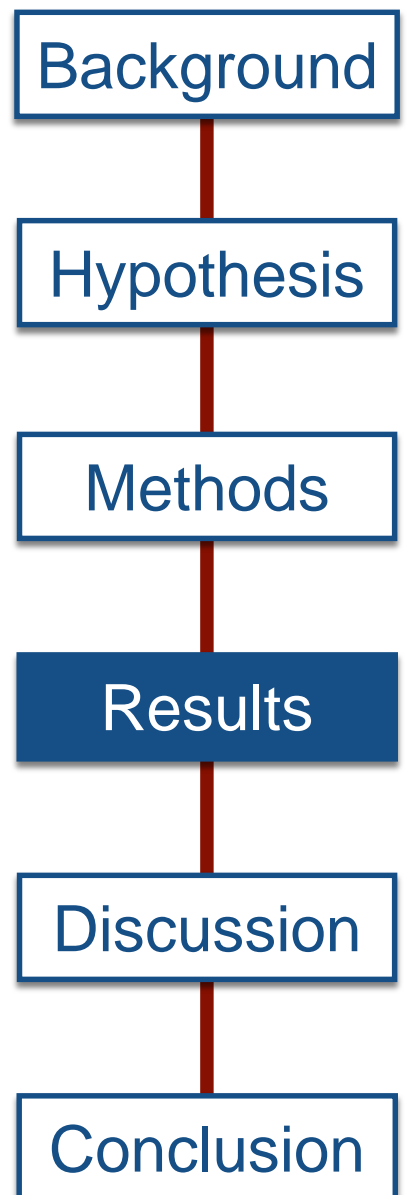
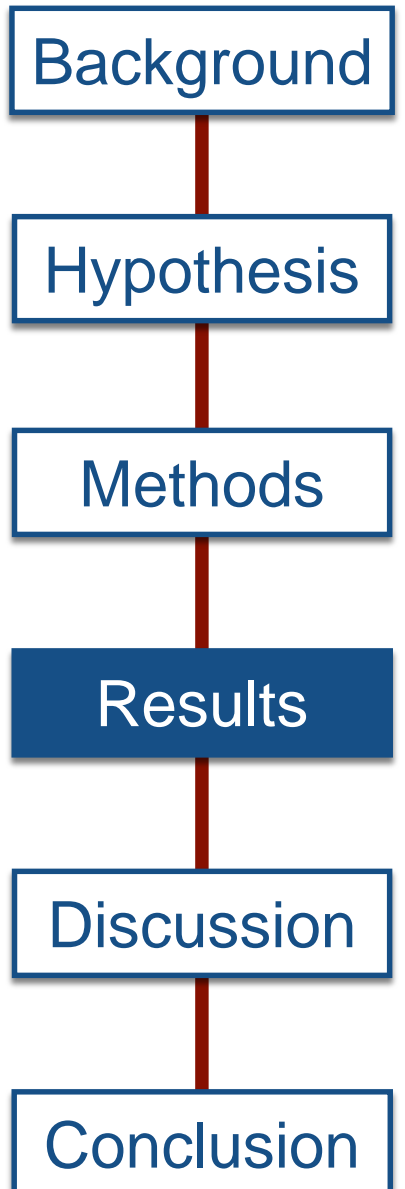# Frequency of urine culture ordering and antimicrobial therapy for UTI for all patients undergoing UA [N, (%)]

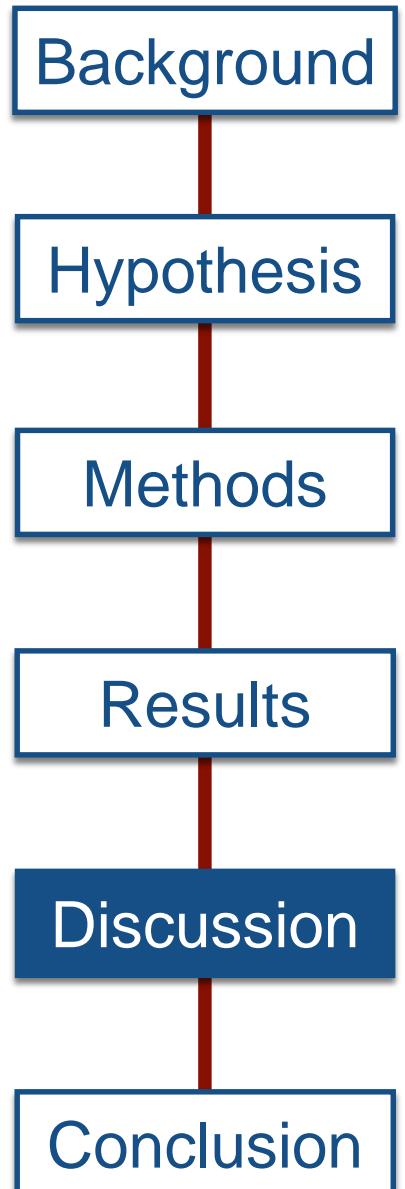|	Symptomatic				Asymptomatic			
+ UA	N=26				N=78			
	Empiric antibiotic for UTI	24 (92)	**No** empiric antibiotics	2 (8)	Empiric antibiotic for UTI	17 (22)	**No** empiric antibiotics	81 (78)
	Urine culture ordered	26 (100)	**No** urine culture ordered	0 (0)	Urine culture ordered	59 (76)	**No** urine culture ordered	19 (24)
	Urine culture positive	21 (81)	Urine culture **Negative**	5 (19)	Urine culture positive	21 (36)	Urine culture **Negative**	38 (64)
	Antibiotic initiated for UTI based on culture	2 (8)	Antibiotics for UTI **Discontinued**	1 (4)	Antibiotic initiated for UTI based on culture	6 (8)	Antibiotics for ASB **Discontinued**	0 (0)
— UA	N=13				N=133			
	Empiric antibiotic for UTI	0 (0)	**No** empiric antibiotics	13 (100)	Empiric antibiotic for UTI	1 (1)	**No** empiric antibiotics	132 (99)
	Urine culture ordered	7 (54)	**No** urine culture ordered	6 (46)	Urine culture ordered	59 (44)	**No** urine culture ordered	74 (56)
	Urine culture positive	2 (29)	Urine culture **Negative**	5 (71)	Urine culture positive	7 (12)	Urine culture **Negative**	52 (78)
	Antibiotic initiated for UTI based on culture	2 (15)	Antibiotics for UTI **Discontinued**	0 (0)	Antibiotic initiated for UTI based on culture	1 (1)	Antibiotics for ASB **Discontinued**	1 (1)
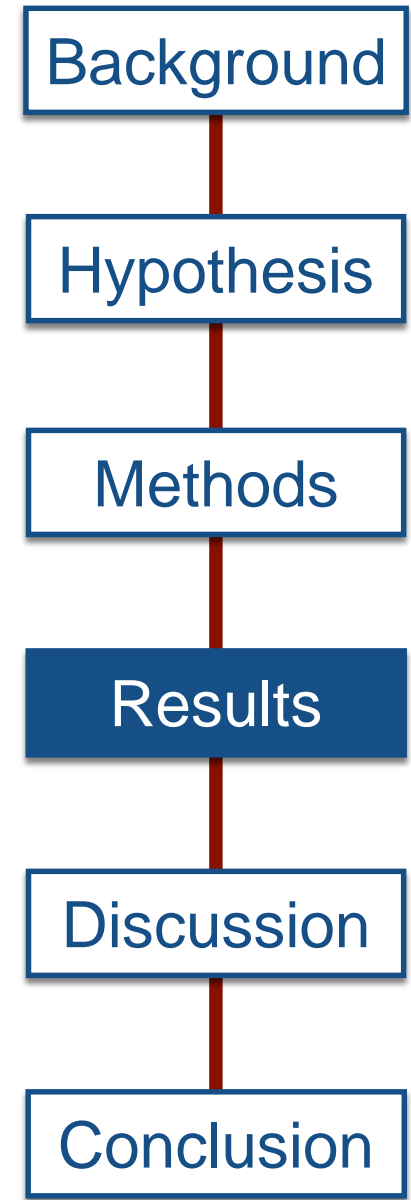
Results

- In asymptomatic patients, positive UA was associated with:

  1. Increased probability of urine culture ordering (p<0.001)

  2. Increased antibiotic prescription (p<0.0002)

- After controlling for other independent variables, multiple (≥3) co-morbidities was associated with UA ordering without indication (OR 5.3, 95% CI 2.5-11, p<0.0001)

Discussion

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- Majority of GIM patients who had a UA lacked an appropriate indication

- Appropriate use of UA in symptomatic patients effectively excluded UTI

- Positive UA from asymptomatic patients increased probability of receiving low-value care

  - Unnecessary urine culture

  - Antibiotics for asymptomatic pyuria/bacteriuria

- Consistent with prior studies that have suggested UA results can contribute to cognitive biases in favour of a diagnosis of UTI[1]

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1. Trautner BW et al. *BMC Med Inform Decis Mak.* 2013;18:48.

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Limitations

- Single centre study, and may not represent ordering practices in other institutions

- Use of a guideline-based definition for UTI may have overestimated the proportion of asymptomatic patients, especially in those who could not reliable communicate their symptoms.

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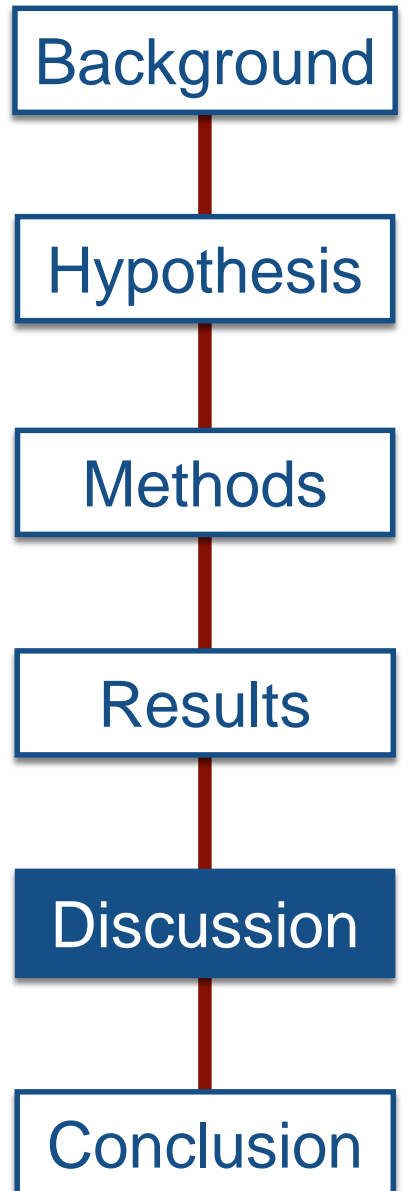
Conclusion

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- While helpful in excluding UTI among symptomatic patients, UA ordering without clinical indication may promote excessive antibiotic use for UTI

- Limiting indiscriminate ordering of UA may represent an effective strategy to improve urine culture and antimicrobial prescribing practices among GIM patients

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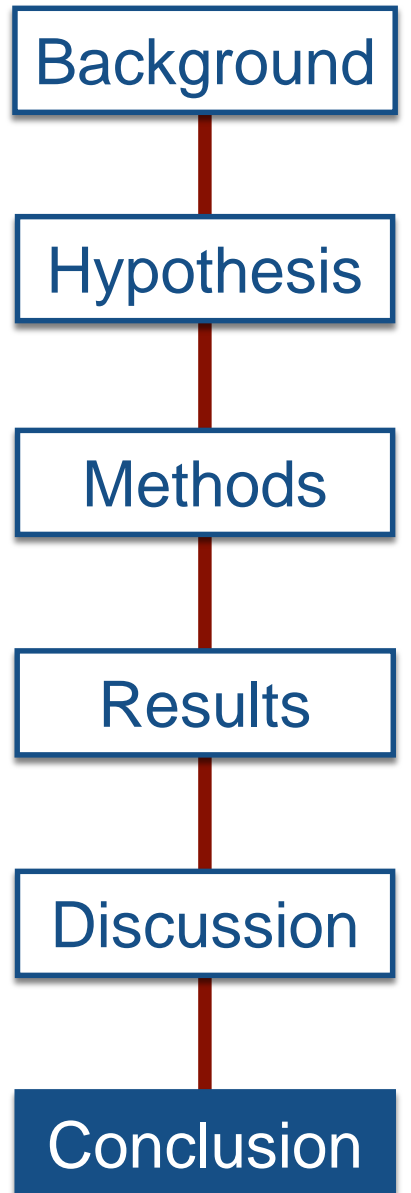
Acknowledgements

- Jerome Leis, MD, MSc

- Alex Kiss, PhD