

Complicated UTI Supplemental Information

Supplemental Table 1 Complicated UTI microbial threshold recommendations with details and justification citations listed by threshold levels

Source	Justification Citations	Region	Date	Threshold CFU/mL	cUTI Description Verbatim*	Sex	Specimen	Conditions
Expert panel ⁵⁰	60,62,64,89,90	USA	1992	None given	Recurrent UTI (patient given antimicrobial prophylaxis)	Women	Not Specified	Two culture documented episodes of acute uncomplicated infection the last 12 months with no structural or functional abnormalities
GESITRA /SEIMC /REIPI ²⁹	118	Spain	2015	None given	Recurrent	Both	Not Specified	Solid organ transplant patient ≥ 3 symptomatic UTI in 12 month or 2 in the previous 6 months

Source	Justification Citations	Region	Date	Threshold CFU/mL	cUTI Description Verbatim*	Sex	Specimen	Conditions
GESITRA /SEIMC /REIP ²⁹	119	Spain	2015	None given	UTI	Both	Not Specified	Solid organ transplant patient. Associated with structural or functional abnormalities of the genitourinary tract or presence of underlying disease, the increase risk of infection or failing therapy. Symptoms
UAA- AAUS ³⁶	No citation	Asia	2018	None given	Acute uncomplicated pyelonephritis	Women	Not Specified	Symptoms

Source	Justification Citations	Region	Date	Threshold CFU/mL	cUTI Description Verbatim*	Sex	Specimen	Conditions
UAA- AAUS ³⁶	No citation	Asia	2018	None given	Complicated UTIs with Benign Prostate Hyperplasia	Men	Not Specified	Symptoms
UAA- AAUS ³⁶	No citation	Asia	2018	None given	Complicated UTI of Urogenital Tuberculosis	Both	Not Specified	Symptoms
UAA- AAUS ³⁶	No citation	Asia	2018	None given	Complicated UTI with Diabetes Mellitus	Both	Not Specified	Symptoms

Source	Justification Citations	Region	Date	Threshold CFU/mL	cUTI Description Verbatim*	Sex	Specimen	Conditions
UAA- AAUS ³⁶	No citation	Asia	2018	None given	Complicated UTI with urolithiasis	Both	Midstream	Symptoms
NIDRR ⁵⁴	No citations, but research discussed	USA	1992	Any count	UTI	Both	Indwelling catheter	Spinal cord injury patients Symptoms and/or signs of tissue invasion
NIDRR ⁵⁴	No citations, but research discussed	USA	1992	Any count	UTI	Both	Suprapubic aspirate	Spinal cord injury patients Symptoms and/or signs of tissue invasion
ACRM AAPMR ⁵²	54,56,76	USA	1995	Any count	UTI	Both	Indwelling catheter	Spinal cord injury patients, signs or symptoms

Source	Justification Citations	Region	Date	Threshold CFU/mL	cUTI Description Verbatim*	Sex	Specimen	Conditions
ACRM AAPMR ⁵²	54,56,91	USA	1995	Any count	UTI	Both	Suprapubic aspirate	Spinal cord injury patients, signs or symptoms
AMMI ²⁵	91	Canada	2005	Any count	Complicated UTI	Both	In and out catheterization	Symptoms
UAA- AAUS ³⁶	54,72	Asia	2018	Any count	Complicated UTI with neurogenic bladder	Both	Suprapubic aspirate	Symptoms
UAA- AAUS ³⁶	54,72	Asia	2018	Any count	Complicated UTI with neurogenic bladder	Both	Indwelling catheter	Symptoms

Source	Justification Citations	Region	Date	Threshold CFU/mL	cUTI Description Verbatim*	Sex	Specimen	Conditions
ASM ⁴⁸	55,94	USA	2022	Any count	UTI	Both	Suprapubic aspirate	Symptoms
NIDRR ⁵⁴	No citations, but research discussed	USA	1992	10 ² - 10 ⁴	UTI	Men	Clean void post condom catheter	Spinal cord injury patients Symptoms and/or signs of tissue invasion
NIDRR ⁵⁴	No citations, but research discussed	USA	1992	≥ 10 ²	UTI	Both	Intermittent catheterization	Spinal cord injury patients Symptoms and/or signs of tissue invasion
NIDRR ⁵⁴	No citations, but research discussed	USA	1992	≥ 10 ²	UTI	Both	Not Specified	Spinal cord injury patients Symptoms and/or signs of tissue invasion

Source	Justification Citations	Region	Date	Threshold CFU/mL	cUTI Description Verbatim*	Sex	Specimen	Conditions
ACRM AAPMR ⁵²	54,56,91	USA	1995	$\geq 10^2$	UTI	Both	Intermittent catheterization	Spinal cord injury patients
AMMI ²⁵	91	Canada	2005	$\geq 10^2$	Complicated UTI	Both	Intermittent catheterization	Symptoms
AMMI ²⁵	76,120	Canada	2005	$\geq 10^2$	Complicated UTI	Both	Indwelling catheterization	Symptoms
GESITRA /SEIMC /REIPI ²⁹	75	Spain	2015	$\geq 10^2$	Cystitis	Both	Catheterized	Transplant patient Symptoms and 1 bacterial species
UAA- AAUS ³⁶	54,72	Asia	2018	$\geq 10^2$	Complicated UTI with	Both	Intermittent catheterization	Symptoms

Source	Justification Citations	Region	Date	Threshold CFU/mL	cUTI Description Verbatim*	Sex	Specimen	Conditions
					neurogenic bladder			
AUA/CUA/ SUFU ³⁸	58,77,85,121,122	North America	2019	10 ²	Recurrent uncomplicated urinary tract infection	Women	Not Specified	Symptomatic, recurrent defined as at least 2 culture proven symptomatic uncomplicated acute cystitis episodes in 6 months or 3 within 1 year in which symptom resolution occurred between culture proven events.

Source	Justification Citations	Region	Date	Threshold CFU/mL	cUTI Description Verbatim*	Sex	Specimen	Conditions
AMDA paltc.org ⁴¹	105,115,123	USA	2020	$\geq 10^2$	Acute pyelonephritis	Both	In and out catheter	Long term care patient Symptoms and ≥ 1 species
AMDA paltc.org ⁴¹	105,123	USA	2020	$\geq 10^2$	Acute simple cystitis	Both	In and out catheter	Long term care patient Symptoms and ≥ 1 species
PHE/NHS ⁴³	124	UK	2020	10^2	UTI	Both	Not Specified	Symptoms and recurrent pyuria may be indicative of UTI and maybe fastidious organisms.
SSGO ⁴²	98	Switzerland	2020	$\geq 10^2$	Complicated UTI	Both	In and out catheterization	Symptoms

Source	Justification Citations	Region	Date	Threshold CFU/mL	cUTI Description Verbatim*	Sex	Specimen	Conditions
SSGO ⁴²	98	Switzerland	2020	$\geq 10^2$	Recurrent UTI	Both	In and out catheterization	Symptoms
ECLM ²³	76,84,125-127	Europe	2000	10^3	UTI	Men	Midstream	Secondary pathogens with 1 species
SOGC ⁴⁶	86	Canada	2010	$> 10^3$	Recurrent UTI	Women	Not Specified	Strong symptoms
SEIMC ¹	77,128,129	Spain	2017	$\geq 10^3$	Cystitis	Men	Not Specified	Symptoms
ASTID ⁴⁰	58,82,130	USA	2019	$> 10^3$	Acute simple cystitis	Both	Not Specified	Transplant patient UTI symptoms and $> 10\text{WBC}/\text{mm}^3$ and isolate is uropathogen. Symptoms

Source	Justification Citations	Region	Date	Threshold CFU/mL	cUTI Description Verbatim*	Sex	Specimen	Conditions
ASTID ⁴⁰	58,82,130	USA	2019	"As above" > 10 ³ or > 10 ⁴	Recurrent UTI	Both	Not Specified	Transplant patient "As above" and ≥ 3 UTI in prior 12 months. Symptoms
PHE/NHS 43	124,131	UK	2020	10 ³	UTI	Men	Not Specified	Symptoms and pure or predominant organism
NIDRR ⁵⁴	No citations, but research discussed	USA	1992	≥ 10 ⁴	UTI	Men	Clean void post condom catheter	Spinal cord injury patient Symptoms and/or signs of tissue invasion
IDSA/FDA 51	64,84,90	USA	1992	≥ 10 ⁴	UTI	Men	Clean catch	Symptomatic and one or more factors associated

Source	Justification Citations	Region	Date	Threshold CFU/mL	cUTI Description Verbatim*	Sex	Specimen	Conditions
								with complicated UTI and ≥ 10 WBC/mm ³
IDSA/FDA 51	88	USA	1992	$\geq 10^4$	Acute uncomplicated pyelonephritis	Both	Midstream	Symptoms and ≥ 10 WBC/mm ³
Expert panel ⁵⁰	88	USA	1992	$\geq 10^4$	Acute uncomplicated pyelonephritis	Both	Midstream	Symptoms and ≥ 10 WBC/mm ³ , no history of clinical evidence of urologic abnormality
ACRM AAPMR ⁵²	54,58,132	USA	1995	$\geq 10^4$	UTI	Men	SCI patient Clean voided from catheter free male with	Symptoms

Source	Justification Citations	Region	Date	Threshold CFU/mL	cUTI Description Verbatim*	Sex	Specimen	Conditions
							condom catheter	
EAU ²⁴	No citations. List of references including ⁶³	Europe	2001	$\geq 10^4$	Acute uncomplicated pyelonephritis	Women	Midstream	Symptoms
EAU ²⁴	No citations. List of references including ⁶³	Europe	2001	$\geq 10^4$	Complicated UTI	Women	In and out catheterization	Symptoms
EAU ²⁴	No citations. List of	Europe	2001	$\geq 10^4$	Complicated UTI	Men	Midstream	Symptoms

Source	Justification Citations	Region	Date	Threshold CFU/mL	cUTI Description Verbatim*	Sex	Specimen	Conditions
references								
including ⁶³								
AWMF (12 societies) ³ 3	⁵¹	Germany	2017	10 ⁴	Acute uncomplicated pyelonephritis	Both	Midstream	Symptomatic, typical uropathogens, in one species
DGU ³⁴	⁵¹	Germany	2017	10 ⁴	Acute uncomplicated pyelonephritis	Both	Midstream	Symptoms
SEIMC ¹	^{51,61,129}	Spain	2017	≥ 10 ⁴	Pyelonephritis	Both	Not Specified	Symptoms
KSID & KSC ³⁷	^{57,133}	Korea	2018	10 ⁴	Acute pyelonephritis	Both	Midstream	Symptoms

Source	Justification Citations	Region	Date	Threshold CFU/mL	cUTI Description Verbatim*	Sex	Specimen	Conditions
UAA- AAUS ³⁶	54,72	Asia	2018	$\geq 10^4$	Complicated UTI with neurogenic bladder	Both	Clean voided from catheter free male with condom catheter	Symptoms
ASTID ⁴⁰	58,82,130	USA	2019	$> 10^4$	Acute pyelonephritis	Both	Not Specified	Transplant patient Symptoms, > 10 WBC/mm ³ , and isolate is uropathogen
ASTID ⁴⁰	58,82,130	USA	2019	$> 10^4$	UTI	Both	Not Specified	Transplant patient Symptoms, > 10 WBC/mm ³ , and isolate is uropathogen

Source	Justification Citations	Region	Date	Threshold CFU/mL	cUTI Description Verbatim*	Sex	Specimen	Conditions
ASM ⁴⁸	55,94	USA	2022	$\geq 10^4$	UTI	Both	In and out catheter	Symptoms
IDSA/FDA ⁵¹	64,90	USA	1992	$\geq 10^5$	Recurrent UTI (antimicrobial prophylaxis)	Women	Not Specified	At least 3 episodes of acute uncomplicated infection documented by culture in last 12 months with no structural/functional abnormalities
IDSA/FDA ⁵¹	64,90	USA	1992	$\geq 10^5$	Complicated UTI	Both	Not Specified	Symptomatic and one or more factors associated with complicated UTI and ≥ 10 WBC/mm ³

Source	Justification Citations	Region	Date	Threshold CFU/mL	cUTI Description Verbatim*	Sex	Specimen	Conditions
Expert panel ⁵⁰	64,84,90	USA	1992	$\geq 10^5$	UTI	Men	Midstream	Symptoms and one or more factors associated with cUTI and $\geq 10\text{WBC/mm}^3$
Expert panel ⁵⁰	64,90	USA	1992	$\geq 10^5$	Complicated UTI	Both	Midstream	Symptoms and one or more factors associated with cUTI and $\geq 10\text{WBC/mm}^3$
EAU ²⁴	No citations, List of references including 63	Europe	2001	$\geq 10^5$	Complicated UTI	Women	Midstream	Symptoms

Source	Justification Citations	Region	Date	Threshold CFU/mL	cUTI Description Verbatim*	Sex	Specimen	Conditions
AMMI ²⁵	51	Canada	2005	$\geq 10^5$	Complicated UTI	Both	Voided	Symptoms
SOGC ⁴⁶	86	Canada	2010	$> 10^5$	Recurrent UTI	Women	Not Specified	Symptoms
GESITRA /SEIMC /REIPI ²⁹	75	Spain	2015	$\geq 10^5$	Cystitis	Men	Clean catch voided	Transplant patient Symptoms and 1 bacterial species
GESITRA /SEIMC /REIPI ²⁹	71	Spain	2015	$\geq 10^5$	Pyelonephritis	Both	Not Specified	Transplant patient Fever and symptoms
ICMR ³⁹	No citations. List of	India	2019	10^5	Acute pyelonephritis	Both	Not Specified	Symptoms

Source	Justification Citations	Region	Date	Threshold CFU/mL	cUTI Description Verbatim*	Sex	Specimen	Conditions
references								
including								
17,26,57								
AMDA paltc.org ⁴¹	105,115,123	USA	2020	$> 10^5$	Acute simple cystitis	Both	Midstream	Long term care patient Symptoms and ≤ 2 species
AMDA paltc.org ⁴¹	105,115,123	USA	2020	$\geq 10^5$	Acute pyelonephritis	Both	Midstream	Long term care patient Symptoms and ≤ 2 species
SSGO ⁴²	98	Switzerland	2020	$\geq 10^5$	Complicated UTI	Both	Midstream	Symptoms
SSGO ⁴²	98	Switzerland	2020	$\geq 10^5$	Recurrent UTI	Both	Midstream	Symptoms

Source	Justification Citations	Region	Date	Threshold CFU/mL	cUTI Description Verbatim*	Sex	Specimen	Conditions
Expert panel; IDSA and HIVMA logos present ⁴⁵	67,85,100,107,134, 135	USA	2022	$\geq 10^5$	Complicated UTI	Both	Not Specified	Symptomatic only
ASM ⁴⁸	66,136	USA	2022	$\geq 10^5$	UTI	Both	Midstream clean catch	Symptoms
ASM ⁴⁸	66,136	USA	2022	$\geq 10^5$	UTI	Both	Indwelling catheter	Symptoms
ASM ⁴⁸	66,136	USA	2022	$\geq 10^5$	UTI	Both	Suprapubic catheter	Symptoms

Source	Justification Citations	Region	Date	Threshold CFU/mL	cUTI Description Verbatim*	Sex	Specimen	Conditions
SCCM and IDSA ⁵³	93,137,138	USA	1998	Unclear	UTI	Both	Not Specified	Intensive care unit patient, Symptoms
SBI, SPI, SBMT ²⁷	81,139,140	Brazil	2013	No consensus	Pyelonephritis	Both	Not Specified	Symptoms
AIS & APC ²⁸	54,141,142	Australia	2015	No standard criteria	UTI	Both	Not Specified	Spinal cord injury patient Symptomatic
ICI-RS ¹³	58,62,78,113,143,144	UK	2019	No consensus	Chronic recurrent UTI	Both	Not Specified	Symptoms
Australia ¹²	33,86,145,146	Australia	2022	No consensus	Recurrent UTI	Women	Not Specified	Symptomatic

Source	Justification Citations	Region	Date	Threshold CFU/mL	cUTI Description Verbatim*	Sex	Specimen	Conditions
				but range				
				discussed				
				was $\geq 10^2$,				
				10^3 , and >				
				10^5				

* The study definition of a complicated UTI can be found in the Methods section under Data Items and Table 1, and enables the sorting of UTIs for data simplification.

Organization Acronym Legend (for Supplemental Tables)

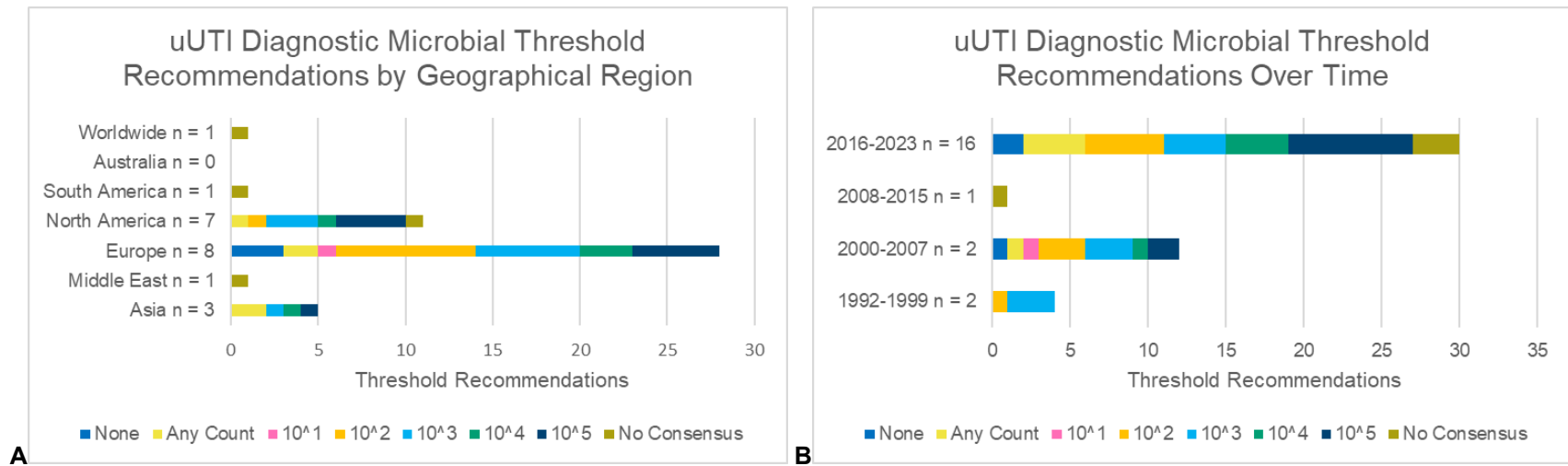
Acronym	Name	Region
AAPMR	American Academy of Physical Medicine and Rehabilitation	USA
AAUS	Asian Association of Urinary Tract Infection and Sexually Transmitted Infection	Asia
ACR	American College of Radiology	USA
ACRM	American Congress of Rehabilitation Medicine	USA
AIS	Australia Institute of Sport	Australia
AMDA	The Society for Post-Acute and Long-Term Care Medicine	USA
AMMI	Association of Medical Microbiology and Infectious Disease	Canada
APC	Australian Paralympic Committee	Australia
ASTID	American Society of Transplantation Infectious Diseases	USA
AUA	American Urology Association	USA
AWMF	German Association of Scientific Medical Societies in Germany	Germany
CDC	Center for Disease Control	USA
CUA	Canadian Urological Association	Canada
DGU	German Society for Urology	Germany
EAU	European Association of Urologists	Europe
ECLM	European Clinical Laboratory Medicine	Europe
ESCMID	European Society of Clinical Microbiology and Infectious Diseases	Europe
FDA	Food and Drug Administration	USA

GESITRA	Group for the Study of Infection in Transplant Recipients	Spain
HIVMA	HIV Medicine Association	USA
ICMR	Indian Council of Medical Research	India
ICI-RS	International Consultation on Incontinence-Research Society	UK
IDSA	Infectious Diseases Society of American	USA
KAUT	Korean Association of Urogenital Tract Infection and Inflammation	Korea
KSID	Korean Society of Infectious Diseases	Korea
KSC	Korean Society for Chemotherapy	Korea
NHS	National Health Service	UK
NIDRR	National Institute on Disability and Rehabilitation Research	USA
NHSN	National Healthcare Safety Network	USA
PHE	Public Health England	UK
REIPI	Spanish Network for Research in Infectious Diseases	Spain
SEIMC	Spanish Society of Infectious Diseases and Clinical Microbiology	Spain
SHEA	Society for Healthcare Epidemiology of America	USA
SPILF	French Society of Infectious Diseases	France
SBI	Sociedade Brasileira de Infectologia	Brazil
SPI	Sociedade Paulista de Infectlogia	Brazil
SBMT	Sociedade Brasileira de Medicina Tropical	Brazil
SCCM	Society of Critical Care Medicine	USA

SOGC	Society of Obstetricians and Gynaecologists of Canada	Canada
SUFU	Society of Urodynamics, Female Pelvic Medicine & Urogenital Reconstruction	USA
SSGO	Swiss Society of Gynaecology and Obstetrics	Switzerland
UAA	Urological Association of Asia	Asia

Uncomplicated UTI Supplemental Information

During this review, 21 guidelines with 47 uUTI-specific recommendations were collected. Like most cUTI subsets, uUTI recommendations showed a lack of consensus (Supplemental Figure 1A and B). Like other UTI guidelines, more publications and recommendations were published in recent years and came from Europe and North America.



Supplemental Figure 1 Uncomplicated UTI (uUTI) microbial threshold recommendations by A) geographical region and B) by time period. The vertical axes indicate the region or time quartile and number of guidelines. The horizontal axes indicate the number of recommendations. Guidelines often included more than one recommendation. Microbial thresholds in CFU/mL are indicated by color (none = navy blue, any count = yellow, 10¹ = pink, 10² = orange, 10³ = light blue, 10⁴ = green, 10⁵ = Oxford blue, and no consensus = khaki).

Uncomplicated UTI Supplemental Information

Supplemental Table 2 Uncomplicated UTI (uUTI) microbial threshold recommendations with details listed by threshold levels

Source	Justification Citations	Region	Date	Threshold CFU/mL	uUTI Description verbatim	Sex	Specimen	Conditions
EAU ²⁴	No citations. List of references including 59,65,73,80,97,147	Europe	2001	Not needed	Acute uncomplicated cystitis	Women	Not Specified	Symptoms
DGU ³⁴	86,148	Germany	2017	Not needed	Acute uncomplicated cystitis	Women	Midstream	Clear cut symptoms
SSGO ⁴²	No evidence provided	Switzerland	2020	Not needed	Uncomplicated UTI	Both	Not Specified	If not recurrent UTI or cUTI

Source	Justification Citations	Region	Date	Threshold CFU/mL	uUTI Description verbatim	Sex	Specimen	Conditions
EAU ²⁴	No citations. List of references including 59,65,73,80,97,147	Europe	2001	Any count	UTI	Both	Suprapubic aspirate	Symptoms
SEIMC ¹	77,128,129	Spain	2017	Any count	Cystitis	Both	Suprapubic aspirate	Symptoms
ICMR ³⁹	No citations. List of references including 17,26,57	India	2019	Any count	Acute cystitis	Both	Clean catch	Symptoms with pyuria

Source	Justification Citations	Region	Date	Threshold CFU/mL	uUTI Description verbatim	Sex	Specimen	Conditions
ICMR ³⁹	No citations. List of references including 17,26,57	India	2019	Any count	Acute cystitis	Both	Suprapubic aspirate	Suprapubic aspirate and symptoms
ASM ⁴⁸	55,94	USA	2022	Any count	UTI	Both	Suprapubic aspirate	Symptoms
ECLM ²³	No evidence provided	Europe	2000	10 ¹	UTI	Both	Suprapubic aspirate	Symptoms with 1-2 species
IDSA/FDA ⁵¹	60,62,89	USA	1992	10 ² - 10 ⁴	UTI with <i>S. saprophyticus</i>	Women	Suprapubic aspirate	Acute symptoms

Source	Justification Citations	Region	Date	Threshold CFU/mL	uUTI Description verbatim	Sex	Specimen	Conditions
ECLM ²³	No evidence provided	Europe	2000	10 ²	UTI	Both	In and out catheterization	Symptoms with 1-2 species
ECLM ²³	No evidence provided	Europe	2000	10 ²	UTI	Both	Midstream	Symptoms in patients with certain urological diseases
ECLM ²³	No evidence provided	Europe	2000	10 ²	UTI	Both	Midstream	Precise evaluation of patients with symptoms and simple cystitis
SEIMC ¹	58,78	Spain	2017	≥ 10 ²	Cystitis	Women	Not Specified	Symptomatic
SEIMC ¹	77,128,129	Spain	2017	≥ 10 ²	Cystitis	Both	In and out catheterization	Symptoms

Source	Justification Citations	Region	Date	Threshold CFU/mL	uUTI Description verbatim	Sex	Specimen	Conditions
PHE/NHS ⁴³	43,62	UK	2020	$\geq 10^2$	UTI	Women	Voided	Strongly symptomatic and single isolate in voided urine
PHE/NHS ⁴³	43,62	UK	2020	$\geq 10^2$	UTI, not recurrent	Women	Not Specified	< 65 years, at least one symptom
SSGO ⁴²	98	Switzerland	2020	$\geq 10^2$	UTI	Both	In and out catheterization	UTI with strong symptoms and antibiotics not effective
Expert panel ⁵⁰	60,62,89	USA	1992	$> 10^3$	Acute uncomplicated UTI	Women	Midstream	Symptoms and > 10 WBC/mm ³

Source	Justification Citations	Region	Date	Threshold CFU/mL	uUTI Description verbatim	Sex	Specimen	Conditions
IDSA/FDA ⁵¹	60,62	USA	1992	$\geq 10^3$	Acute uncomplicated UTI	Women	Not Specified	Symptoms and ≥ 10 WBC/mm ³
IDSA/FDA ⁵¹	149	USA	1992	$\geq 10^3$	Candiduria (or <i>T. glabrata</i>)	Both	Not Specified	Pyuria (>10 WBC/mm ³) and fungal isolation on two consecutive specimens with 24-120 hours apart with symptoms and absence of indwelling foreign body.
ECLM ²³	62	Europe	2000	10^3	UTI	Both	Midstream	Primary pathogens <i>E. coli</i> or <i>S. saprophyticus</i>

Source	Justification Citations	Region	Date	Threshold CFU/mL	uUTI Description verbatim	Sex	Specimen	Conditions
								with symptoms. Can be 1-2 species.
ECLM ²³	62	Europe	2000	10 ³	UTI	Both	Midstream	Symptoms with two species and primary pathogen
EAU ²⁴	No citations. List of references including 59,65,73,80,97,147	Europe	2001	≥ 10 ³	Acute uncomplicated cystitis	Women	Midstream	Symptoms
AWMF (12 societies) ³³	51	Germany	2017	10 ³	Acute uncomplicated cystitis	Women	Midstream	Symptomatic, typical uropathogens, in one species

Source	Justification Citations	Region	Date	Threshold CFU/mL	uUTI Description verbatim	Sex	Specimen	Conditions
DGU ³⁴	51	Germany	2017	10 ³	Acute uncomplicated cystitis	Women	Midstream	Symptoms
UAA- AAUS ³⁶	58	Asia	2018	≥ 10 ³	Acute uncomplicated cystitis	Women	Not Specified	Symptomatic
PHE/NHS ⁴³	43,62	UK	2020	≥ 10 ³	UTI	Both	Not Specified	Symptoms and <i>E. coli</i> or <i>S. saprophyticus</i>
ECLM ²³	No evidence provided	Europe	2000	10 ⁴	UTI	Women	Midstream	Secondary pathogens with 1 species
KAUT ³²	61,150,151	Korea	2017	> 10 ⁴	Acute cystitis	Both	Not Specified	Symptoms
PHE/NHS ⁴³	43	UK	2020	10 ⁴ - 10 ⁵	UTI	Both	Not Specified	Symptoms

Source	Justification Citations	Region	Date	Threshold CFU/mL	uUTI Description verbatim	Sex	Specimen	Conditions
PHE/NHS ⁴³	43	UK	2020	$\geq 10^4$	UTI	Both	Not Specified	Symptoms
ASM ⁴⁸	66,136	USA	2022	$\geq 10^4$	UTI	Both	In and out catheter	Symptoms
ECLM ²³	No evidence provided	Europe	2000	10^5	UTI	Both	Midstream	"Doubtful" pathogens with symptoms
ECLM ²³	No evidence provided	Europe	2000	10^5	UTI	Both	Midstream	Symptoms with two species and secondary pathogen
SPILF ³⁵	58	France	2018	$\geq 10^5$	Acute cystitis	Women	Not Specified	Symptoms and pregnancy
FDA ⁹	No evidence provided	USA	2019	$\geq 10^5$	Uncomplicated UTI	Women	Midstream clean catch	Symptoms

Source	Justification Citations	Region	Date	Threshold CFU/mL	uUTI Description verbatim	Sex	Specimen	Conditions
ICMR ³⁹	No citations. List of references including 17,26,57	India	2019	10 ⁵	Acute cystitis	Both	Clean catch	Symptoms
PHE/NHS ⁴³	43	UK	2020	≥ 10 ⁵	UTI	Both	Not Specified	Symptoms and mixed growth with 1 dominant organism
SSGO ⁴²	98	Switzerland	2020	≥ 10 ⁵	UTI	Both	Midstream	UTI with strong symptoms and antibiotics not effective
ACR ⁴⁴	145,152,153	USA	2020	> 10 ⁵	UTI	Both	Clean catch	Symptoms

Source	Justification Citations	Region	Date	Threshold CFU/mL	uUTI Description verbatim	Sex	Specimen	Conditions
Expert panel; IDSA and HIVMA logos present ⁴⁵	66,85,100,107,134	USA	2022	$\geq 10^5$	UTI	Both	Not Specified	Symptomatic only
ASM ⁴⁸	55,94	USA	2022	$\geq 10^5$	UTI	Both	Midstream clean catch	Symptoms
SBI, SPI & SBMT ²⁷	81,139,140	Brazil	2013	No consensus	Candiduria	Both	Not Specified	Symptoms
Kuwait ³⁰	81,83,154–159	Kuwait	2017	None can be given	Candiduria	Both	Not Specified	Symptoms

Source	Justification Citations	Region	Date	Threshold CFU/mL	uUTI Description verbatim	Sex	Specimen	Conditions
USA ³¹	26,160	USA	2017	None can be given. Discussed, but none given.	UTI	Both	Not Specified	Culture only when UTI symptoms are present
GSK Funded but no input into content ⁴⁷	58	Worldwide	2022	No consensus	Uncomplicated urinary tract infection	Both	Not Specified	Symptoms

Organization Acronym Legend (for Supplemental Tables)

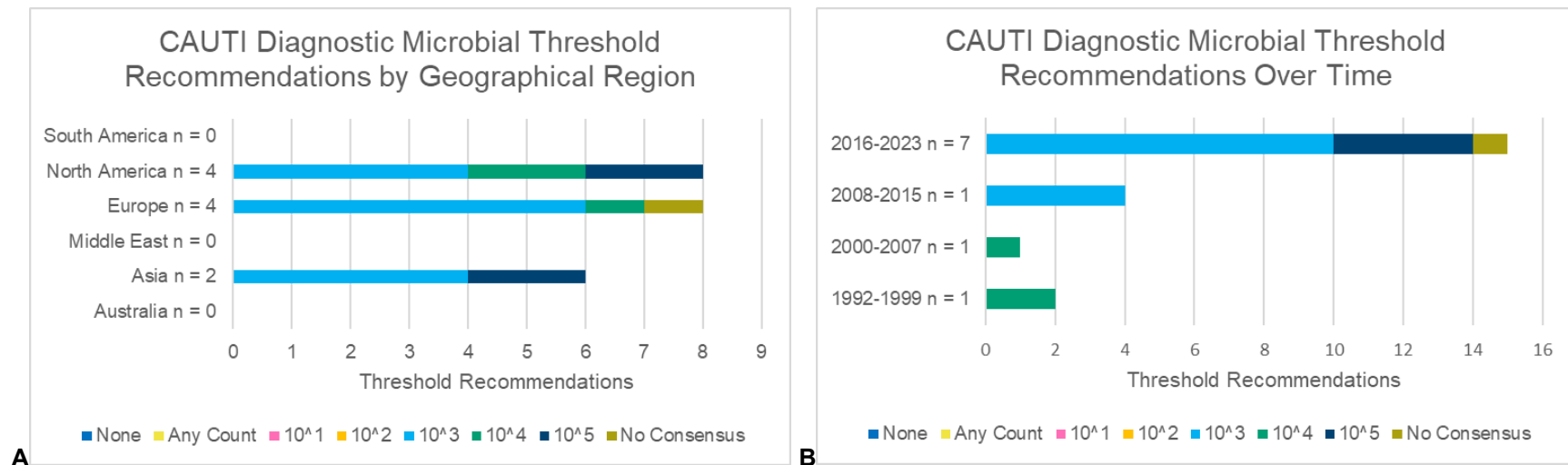
Acronym	Name	Region
AAPMR	American Academy of Physical Medicine and Rehabilitation	USA
AAUS	Asian Association of Urinary Tract Infection and Sexually Transmitted Infection	Asia
ACR	American College of Radiology	USA
ACRM	American Congress of Rehabilitation Medicine	USA
AIS	Australia Institute of Sport	Australia
AMDA	The Society for Post-Acute and Long-Term Care Medicine	USA
AMMI	Association of Medical Microbiology and Infectious Disease	Canada
APC	Australian Paralympic Committee	Australia
ASTID	American Society of Transplantation Infectious Diseases	USA
AUA	American Urology Association	USA
AWMF	German Association of Scientific Medical Societies in Germany	Germany
CDC	Center for Disease Control	USA
CUA	Canadian Urological Association	Canada
DGU	German Society for Urology	Germany
EAU	European Association of Urologists	Europe
ECLM	European Clinical Laboratory Medicine	Europe
ESCMID	European Society of Clinical Microbiology and Infectious Diseases	Europe
FDA	Food and Drug Administration	USA

GESITRA	Group for the Study of Infection in Transplant Recipients	Spain
HIVMA	HIV Medicine Association	USA
ICMR	Indian Council of Medical Research	India
ICI-RS	International Consultation on Incontinence-Research Society	UK
IDSA	Infectious Diseases Society of American	USA
KAUT	Korean Association of Urogenital Tract Infection and Inflammation	Korea
KSID	Korean Society of Infectious Diseases	Korea
KSC	Korean Society for Chemotherapy	Korea
NHS	National Health Service	UK
NIDRR	National Institute on Disability and Rehabilitation Research	USA
NHSN	National Healthcare Safety Network	USA
PHE	Public Health England	UK
REIPI	Spanish Network for Research in Infectious Diseases	Spain
SEIMC	Spanish Society of Infectious Diseases and Clinical Microbiology	Spain
SHEA	Society for Healthcare Epidemiology of America	USA
SPILF	French Society of Infectious Diseases	France
SBI	Sociedade Brasileira de Infectologia	Brazil
SPI	Sociedade Paulista de Infectlogia	Brazil
SBMT	Sociedade Brasileira de Medicina Tropical	Brazil
SCCM	Society of Critical Care Medicine	USA

SOGC	Society of Obstetricians and Gynaecologists of Canada	Canada
SUFU	Society of Urodynamics, Female Pelvic Medicine & Urogenital Reconstruction	USA
SSGO	Swiss Society of Gynaecology and Obstetrics	Switzerland
UAA	Urological Association of Asia	Asia

CAUTI Supplemental Information

During this review, 10 guidelines with 22 CAUTI-specific recommendations were collected. Unlike other cUTI subsets, CAUTI recommendations showed more consensus (Supplemental Figure 2A and B). Like other UTI guidelines, more publications and recommendations were published in recent years and most came from Europe and North America. CAUTI recommendations were not sex specific. Three guidelines provided four recommendations for higher risk patients [ICU n =2, SCI n = 1, and Long Term Care (LTC), n = 1].



Supplemental Figure 2 CAUTI microbial threshold recommendations by A) geographical region and B) by time period. The vertical axes indicate the number of guidelines by region or time quartile. The horizontal axes indicate the number of recommendations. Guidelines often included more than one recommendation. Microbial thresholds in CFU/mL are indicated by color (none = navy blue, any count = yellow, 10¹ = pink, 10² = orange, 10³ = light blue, 10⁴ = green, 10⁵ = Oxford blue, and no consensus = khaki).

CAUTI Supplemental Information

Supplemental Table 3 Catheter Associated UTI (CAUTI) microbial threshold recommendations with details listed by threshold levels

Source	Justification Citations	Region	Date	Threshold CFU/mL	CAUTI Description verbatim	Sex	Specimen	Conditions
IDSA ²⁶	62,76	USA	2010	$\geq 10^3$	CAUTI	Both	Indwelling urethral catheter	Symptoms with 1 or more bacterial species
IDSA ²⁶	26	USA	2010	$\geq 10^3$	CAUTI	Both	Indwelling suprapubic catheter	Symptoms with 1 or more bacterial species
IDSA ²⁶	26	USA	2010	$\geq 10^3$	CAUTI	Both	Intermittent catheterization	Symptoms with 1 or more bacterial species
IDSA ²⁶	26	USA	2010	$\geq 10^3$	CAUTI	Both	Midstream void	Symptoms with 1 or more bacterial species

Source	Justification Citations	Region	Date	Threshold CFU/mL	CAUTI Description verbatim	Sex	Specimen	Conditions
SEIMC ¹	26	Spain	2017	$\geq 10^3$	CAUTI	Both	Indwelling catheter	Symptoms
SEIMC ¹	26	Spain	2017	$\geq 10^3$	CAUTI	Both	Midstream void	Symptoms
UAA-AAUS ³⁶	No evidence provided	Asia	2018	$\geq 10^3$ and $< 10^5$	CAUTI	Both	Not Specified	No more than 2 species of microorganisms and one of [positive dipstick, pyuria, or microbes on Gram stain]
UAA-AAUS ³⁶	No evidence provided	Asia	2018	$< 10^3$	CAUTI	Both	Not Specified	No more than 2 species of microorganisms, no antibiotics
ICMR ³⁹	List of references at end of	India	2019	10^3	CAUTI	Both	Catheter	Symptoms with 1 or more bacterial species

Source	Justification Citations	Region	Date	Threshold CFU/mL	CAUTI Description verbatim	Sex	Specimen	Conditions
	section including ^{10,72,161,162}							
ICMR ³⁹	List of references at end of section including 10,72,161,162	India	2019	10 ³	CAUTI	Both	Midstream	Symptoms with 1 or more bacterial species
EAU ⁴⁹	26	Europe	2022	≥ 10 ³	CAUTI	Both	Catheter	Symptomatic and ≥ 1 bacterial species
EAU ⁴⁹	26	Europe	2022	≥ 10 ³	CAUTI	Both	Midstream	Symptomatic and ≥ 1 bacterial species

Source	Justification Citations	Region	Date	Threshold CFU/mL	CAUTI Description verbatim	Sex	Specimen	Conditions
EAU ⁴⁹	26	Europe	2022	$\geq 10^3$	CAUTI	Both	Catheter	Symptoms with 1 or more species
EAU ⁴⁹	26	Europe	2022	$\geq 10^3$	CAUTI	Both	Midstream	Symptoms with 1 or more species
SCCM and IDSA ⁵³	93,137,138	USA	1998	$> 10^4$	CAUTI	Both	Clean catch	Intensive Care Unit patients Symptoms, especially if pyuria is present
SCCM and IDSA ⁵³	93,137,138	USA	1998	$> 10^4$	CAUTI	Both	Catheter	Intensive Care Unit patients Symptoms, especially if pyuria is present
ECLM ²³	No evidence provided	Europe	2000	10^4	CAUTI	Both	Indwelling catheter	Symptoms with 1-3 species

Source	Justification Citations	Region	Date	Threshold CFU/mL	CAUTI Description verbatim	Sex	Specimen	Conditions
UAA- AAUS ³⁶	No evidence provided	Asia	2018	$\geq 10^5$	CAUTI	Both	Not Specified	No more than 2 species of microorganisms, symptoms
UAA- AAUS ³⁶	No evidence provided	Asia	2018	$\geq 10^5$	CAUTI	Both	Not Specified	No symptoms, no antibiotics unless undergoing a urological procedures
AMDA paltc.org 41	105,115,123	USA	2020	$\geq 10^5$	CAUTI	Both	Not Specified	Long Term Care patient Symptoms and ≥ 1 species
Expert panel; IDSA and HIVMA	66,85,100,107,134	USA	2022	$\geq 10^5$	CAUTI	Both	Catheter	Symptomatic only

Source	Justification	Region	Date	Threshold	CAUTI	Sex	Specimen	Conditions
	Citations			CFU/mL	Description			
					verbatim			
logos								
present ⁴								
5								
ICI-RS ¹³	No evidence provided	UK	2019	No consensus	Recurrent CAUTI	Both	Intermittent, Catheterization	Neurological patients, Spinal Cord Injury patients, signs, or symptoms

Organization Acronym Legend (for Supplemental Tables)

Acronym	Name	Region
AAPMR	American Academy of Physical Medicine and Rehabilitation	USA
AAUS	Asian Association of Urinary Tract Infection and Sexually Transmitted Infection	Asia
ACR	American College of Radiology	USA
ACRM	American Congress of Rehabilitation Medicine	USA
AIS	Australia Institute of Sport	Australia
AMDA	The Society for Post-Acute and Long-Term Care Medicine	USA
AMMI	Association of Medical Microbiology and Infectious Disease	Canada
APC	Australian Paralympic Committee	Australia
ASTID	American Society of Transplantation Infectious Diseases	USA
AUA	American Urology Association	USA
AWMF	German Association of Scientific Medical Societies in Germany	Germany
CDC	Center for Disease Control	USA
CUA	Canadian Urological Association	Canada
DGU	German Society for Urology	Germany
EAU	European Association of Urologists	Europe
ECLM	European Clinical Laboratory Medicine	Europe
ESCMID	European Society of Clinical Microbiology and Infectious Diseases	Europe
FDA	Food and Drug Administration	USA

GESITRA	Group for the Study of Infection in Transplant Recipients	Spain
HIVMA	HIV Medicine Association	USA
ICMR	Indian Council of Medical Research	India
ICI-RS	International Consultation on Incontinence-Research Society	UK
IDSA	Infectious Diseases Society of American	USA
KAUT	Korean Association of Urogenital Tract Infection and Inflammation	Korea
KSID	Korean Society of Infectious Diseases	Korea
KSC	Korean Society for Chemotherapy	Korea
NHS	National Health Service	UK
NIDRR	National Institute on Disability and Rehabilitation Research	USA
NHSN	National Healthcare Safety Network	USA
PHE	Public Health England	UK
REIPI	Spanish Network for Research in Infectious Diseases	Spain
SEIMC	Spanish Society of Infectious Diseases and Clinical Microbiology	Spain
SHEA	Society for Healthcare Epidemiology of America	USA
SPILF	French Society of Infectious Diseases	France
SBI	Sociedade Brasileira de Infectologia	Brazil
SPI	Sociedade Paulista de Infectlogia	Brazil
SBMT	Sociedade Brasileira de Medicina Tropical	Brazil
SCCM	Society of Critical Care Medicine	USA

SOGC	Society of Obstetricians and Gynaecologists of Canada	Canada
SUFU	Society of Urodynamics, Female Pelvic Medicine & Urogenital Reconstruction	USA
SSGO	Swiss Society of Gynaecology and Obstetrics	Switzerland
UAA	Urological Association of Asia	Asia