

2018-2021 HAI Pathogens & Antimicrobial Resistance Report
Data Tables for Pediatric HAIs

These data tables accompany the 2018-2021 HAI Pathogens & Antimicrobial Resistance Report and were populated using data reported to the National Healthcare Safety Network (NHSN). More information about the methods and findings from this report are available at:
<https://www.cdc.gov/nhsn/hai-report/index.html>

Table P1. Facilities Reporting at Least 1 HAI Pathogen to NHSN, Pediatrics¹, 2018 – 2021

Facility Type	Facilities		Pathogens	
	#	%	#	%
General	784	84.8	10,967	48.3
Children's	93	10.1	10,521	46.4
Women's and Children's	12	1.3	737	3.2
Women's	8	0.9	138	0.6
Military	6	0.6	31	0.1
Critical Access	5	0.5	9	<0.1
Orthopedic	5	0.5	6	<0.1
Surgical	5	0.5	14	0.1
Free-standing Inpatient Rehabilitation	4	0.4	8	<0.1
Oncology	3	0.3	259	1.1

Bed Size	Facilities		Pathogens	
	#	%	#	%
1-200	210	22.7	2,308	10.2
201-350	276	29.8	5,999	26.4
351-500	217	23.5	5,259	23.2
≥ 501	222	24.0	9,124	40.2
Total	925	100.0	22,690	100.0

Note: Refer to [Technical Resources](#) for more information about the acronyms and terms used in this table.

Footnotes:

1. Refer to [Methods](#) for criteria used to define adult and pediatric patient populations.

Table P2. Frequency of Pathogens and HAI Events Reported to NHSN, by HAI Type, Pediatrics, 2018-2021

HAI Type	Pathogens ¹		HAI Events ²	
	#	%	#	%
CLABSI	15,755	69.4	14,111	68.2
SSI	5,282	23.3	5,054	24.4
CAUTI	1,653	7.3	1,512	7.3
Total	22,690	100.0	20,677	100.0

Note: Refer to [Technical Resources](#) for more information about the acronyms and terms used in this table.

Footnotes:

1. Between 1-3 pathogens are required to be reported to NHSN for each CLABSI and CAUTI event. Between 0 -3 pathogens can be reported to NHSN for each SSI event.
2. There were 1,292 pediatric SSIs reported to NHSN without a pathogen from 2018 - 2021. These events are included in the event counts in Table 2.

Table P3: The Top 15 HAI Pathogens Reported to NHSN, Pediatrics, 2018 - 2021¹

Pathogen	# Pathogens	% Pathogens	Rank
<i>Staphylococcus aureus</i>	3,385	14.9	1
<i>Escherichia coli</i>	2,910	12.8	2
Coagulase-negative staphylococci	2,557	11.3	3
<i>Enterococcus faecalis</i> ²	2,028	8.9	4
Select <i>Klebsiella</i> spp.	1,946	8.6	5
<i>Pseudomonas aeruginosa</i>	1,413	6.2	6
<i>Enterobacter</i> spp.	1,191	5.2	7
Viridans group streptococci	1,160	5.1	8
Other <i>Candida</i> spp. ²	728	3.2	9
<i>Serratia</i> spp.	580	2.6	10
<i>Candida albicans</i> ²	562	2.5	11
<i>Enterococcus faecium</i> ²	400	1.8	12
Other <i>Enterococcus</i> spp. ²	325	1.4	13
<i>Bacteroides</i> spp.	276	1.2	14
<i>Citrobacter</i> spp.	192	0.8	15
Other pathogen	3,037	13.4	
Total	22,690	100.0	

Note: Refer to [Technical Resources](#) for more information about the acronyms and terms used in this table.

Footnotes:

1. [Supplemental data tables](#) are available for download that contain HAI pathogen distributions for each year individually.
2. When analyzed at the genus-level, *Enterococcus* spp. ranked #3 (12.1%) and *Candida* spp. ranked #7 (6.2%).

Table P4. The Top 15 CLABSI Pathogens Reported to NHSN, by Location Type, Pediatrics, 2018-2021

	NICUs (n=698 hospitals)			Pediatric Oncology Units ¹ (n=111 hospitals)			Pediatric ICUs ² (n=247 hospitals)			Pediatric Wards ³ (n=263 hospitals)		
Pathogen	# Pathogens	% Pathogens	Rank	# Pathogens	% Pathogens	Rank	# Pathogens	% Pathogens	Rank	# Pathogens	% Pathogens	Rank
<i>Staphylococcus aureus</i>	1,346	27.2	1	281	6.2	5	511	13.6	2	324	12.6	2
Coagulase-negative staphylococci	931	18.8	2	545	12.1	2	428	11.4	3	217	8.5	4
<i>Escherichia coli</i>	593	12.0	3	530	11.8	3	172	4.6	9	214	8.3	5
<i>Enterococcus faecalis</i> ⁴	511	10.3	4	225	5.0	6	553	14.8	1	238	9.3	3
Select <i>Klebsiella</i> spp.	375	7.6	5	440	9.8	4	389	10.4	4	346	13.5	1
<i>Candida albicans</i> ⁴	196	4.0	6	35	0.8	17	106	2.8	11	70	2.7	11
<i>Enterobacter</i> spp.	167	3.4	7	193	4.3	8	275	7.3	5	171	6.7	6
<i>Serratia</i> spp.	148	3.0	8	36	0.8	16	188	5.0	7	107	4.2	9
<i>Pseudomonas aeruginosa</i>	144	2.9	9	217	4.8	7	178	4.8	8	97	3.8	10
Other <i>Candida</i> spp. ⁴	114	2.3	10	162	3.6	9	241	6.4	6	131	5.1	8
Group B streptococci	98	2.0	11	15	0.3	29	16	0.4	19	8	0.3	25
<i>Acinetobacter</i> spp.	28	0.6	12	42	0.9	15	46	1.2	13	32	1.2	14
<i>Candida glabrata</i> ⁴	25	0.5	13	22	0.5	22	21	0.6	16	21	0.8	17
<i>Citrobacter</i> spp.	23	0.5	14	30	0.7	19	22	0.6	15	31	1.2	15
<i>Enterococcus faecium</i> ⁴	22	0.4	15	130	2.9	10	109	2.9	10	49	1.9	12
Other pathogen	224	4.5		1,595	35.5		490	13.1		511	19.9	
Total	4,945	100.0		4,498	100.0		3,745	100.0		2,567	100.0	

Note: Refer to [Technical Resources](#) for more information about the acronyms and terms used in this table.

Footnotes:

1. Some rankings are not shown: Viridans group streptococci (#1, 15.1%); Other *Enterococcus* spp. (#11, 1.9%); *Rothia mucilaginosa* (#12, 1.8%); *Granulicatella adiacens* (#13, 1.4%); *Stenotrophomonas maltophilia* (#14, 1.2%).
2. Some rankings are not shown: *Stenotrophomonas maltophilia* (#12, 1.9%); Other *Enterococcus* spp. (#14, 1.2%).
3. Some rankings are not shown: Viridans group streptococci (#7, 5.3%); Other *Enterococcus* spp. (#13, 1.4%).
4. When analyzed at the genus-level, *Candida* spp. and *Enterococcus* spp. resulted in the following rankings:

- a. *Candida* spp. - NICUs (#6, 6.8%); oncology units (#7, 4.9%); ICUs (#5, 9.8%); wards (#4, 8.6%).
- b. *Enterococcus* spp. - NICUs (#4, 11.0%); oncology units (#5, 9.8%); ICUs (#1, 18.9%); wards (#3, 12.6%).

Table P5. The Top 15 CAUTI Pathogens Reported to NHSN, Pediatrics, 2018-2021

Pathogen	All Reporting Facility & Location Types ¹ (n=268 facilities)		
	# Pathogens	% Pathogens	Rank
<i>Escherichia coli</i>	529	32.0	1
<i>Pseudomonas aeruginosa</i>	328	19.8	2
<i>Enterococcus faecalis</i> ²	195	11.8	3
Select <i>Klebsiella</i> spp.	168	10.2	4
<i>Enterobacter</i> spp.	99	6.0	5
Coagulase-negative staphylococci	72	4.4	6
<i>Citrobacter</i> spp.	44	2.7	7
<i>Staphylococcus aureus</i>	32	1.9	8
<i>Proteus</i> spp.	31	1.9	9
Other <i>Enterococcus</i> spp. ²	29	1.8	10
<i>Enterococcus faecium</i> ²	28	1.7	11
<i>Serratia</i> spp.	27	1.6	12
<i>Morganella</i> spp.	11	0.7	13
<i>Stenotrophomonas maltophilia</i>	10	0.6	14
<i>Acinetobacter</i> spp.	8	0.5	15
Other pathogen	42	2.5	
Total	1,653	100.0	

Note: Refer to [Technical Resources](#) for more information about the acronyms and terms used in this table.

Footnotes:

1. There were no differences in the CAUTI pathogen distributions across facility or location types.
2. When analyzed at the genus-level, *Enterococcus* spp. ranked #3 (15.2%).

Table P6. Frequency of SSI Pathogens, by Surgical Category and SSI Type, Pediatrics, 2018-2021

	All SSIs (n=479 hospitals)		Superficial Incisional		Deep Incisional		Organ/Space	
Surgical Category	# Pathogens	% Pathogens	# Pathogens	% Pathogens	# Pathogens	% Pathogens	# Pathogens	% Pathogens
Abdominal	3,060	57.9	902	64.1	188	25.1	1,970	63.0
Orthopedic	892	16.9	231	16.4	439	58.7	222	7.1
Neurosurgical	793	15.0	68	4.8	42	5.6	683	21.8
Cardiac	427	8.1	151	10.7	47	6.3	229	7.3
Ob/Gyn	73	1.4	41	2.9	15	2.0	17	0.5
Vascular	22	0.4	6	0.4	16	2.1	0	0.0
Kidney	10	0.2	4	0.3	0	0.0	6	0.2
Neck	4	0.1	3	0.2	1	0.1	0	0.0
Breast	1	<0.1	1	<0.1	0	0.0	0	0.0
All surgery types	5,282	100.0	1,407	100.0	748	100.0	3,127	100.0

Note: Refer to [Technical Resources](#) for more information about the acronyms and terms used in this table.

Table P7. The Top 15 SSI Pathogens Reported to NHSN Following Surgery Types¹ with High Pathogen Volume, Pediatrics, 2018-2021

	All Surgery Types ¹			Abdominal ²			Orthopedic ³			Neurosurgical ⁴			Cardiac ⁵		
Pathogen	# Pathogens	% Pathogens	Rank	# Pathogens	% Pathogens	Rank	# Pathogens	% Pathogens	Rank	# Pathogens	% Pathogens	Rank	# Pathogens	% Pathogens	Rank
<i>Staphylococcus aureus</i>	891	16.9	1	220	7.2	5	273	30.6	1	202	25.5	1	171	40.0	1
<i>Escherichia coli</i>	872	16.5	2	725	23.7	1	100	11.2	2	30	3.8	8	11	2.6	7
<i>Pseudomonas aeruginosa</i>	449	8.5	3	253	8.3	3	100	11.2	2	64	8.1	3	26	6.1	3
Coagulase-negative staphylococci	364	6.9	4	70	2.3	11	54	6.1	6	168	21.2	2	60	14.1	2
Viridans group streptococci	316	6.0	5	268	8.8	2	2	0.2	24	32	4.0	7	11	2.6	7
<i>Enterococcus faecalis</i> ⁶	306	5.8	6	235	7.7	4	21	2.4	8	21	2.6	10	25	5.9	4
<i>Enterobacter</i> spp.	286	5.4	7	169	5.5	7	64	7.2	4	33	4.2	6	17	4.0	5
<i>Bacteroides</i> spp.	230	4.4	8	214	7.0	6	12	1.3	11	1	0.1	33	1	0.2	27
Select <i>Klebsiella</i> spp.	228	4.3	9	120	3.9	9	59	6.6	5	42	5.3	4	4	0.9	12
<i>Candida albicans</i> ⁶	155	2.9	10	127	4.2	8	8	0.9	12	10	1.3	13	8	1.9	9
Other <i>Enterococcus</i> spp. ⁶	119	2.3	11	107	3.5	10	8	0.9	12	0	0.0	.	2	0.5	21
<i>Proteus</i> spp.	82	1.6	12	30	1.0	14	40	4.5	7	4	0.5	17	3	0.7	14
Other <i>Candida</i> spp. ⁶	80	1.5	13	46	1.5	13	7	0.8	15	20	2.5	11	6	1.4	10
<i>Serratia</i> spp.	74	1.4	14	17	0.6	18	13	1.5	10	26	3.3	9	17	4.0	5
<i>Enterococcus faecium</i> ⁶	62	1.2	15	54	1.8	12	7	0.8	15	1	0.1	33	0	0.0	.
Other pathogen	768	14.5		405	13.2		124	13.9		139	17.5		65	15.2	
Total	5,282	100.0		3,060	100.0		892	100.0		793	100.0		427	100.0	

Note: Refer to [Technical Resources](#) for more information about the acronyms and terms used in this table.

Footnotes:

1. The top 4 surgical categories by pathogen volume are shown in this table. "All surgery types" consists of all NHSN procedures codes combined and is not limited to the 4 categories shown in the table.
2. Some ranks are not shown: *Citrobacter* spp. (#15, 0.8%).
3. Some rankings are not shown: *Cutibacterium acnes* (#9, 1.8%); *Citrobacter* spp. (tied for #12, 0.9%); Group A streptococci (tied for #15, 0.8%).

4. Some rankings are not shown: *Cutibacterium acnes* (#5, 4.5%); *Acinetobacter* spp. (#12, 1.4%); *Citrobacter* spp. (#14, 0.9%); *Micrococcus luteus* and gram-positive coccus not specified (#15, 0.6%).
5. Some rankings are not shown: *Cutibacterium acnes* (#11, 1.2%); *Aspergillus fumigatus* (tied for #12, 0.9%).
6. When analyzed on the Genus-level for all procedures, *Candida* spp. ranked #8 (4.8%) and *Enterococcus* spp. ranked #3 (9.2%).

Table P8. Percent of CLABSI Pathogens That Were Resistant to Selected Antimicrobials and Classified as "Urgent" or "Serious" Antimicrobial Resistant Threats¹, by Location Type, Pediatrics, 2018-2021

Pathogen, Antimicrobial Phenotype	NICUs			Pediatric ICUs			Pediatric Oncology Units			Pediatric Wards		
	# Reported	% Tested	%R	# Reported	% Tested	%R	# Reported	% Tested	%R	# Reported	% Tested	%R
<i><u>Urgent Threats</u></i>												
<i>Acinetobacter</i> spp.	28			46			42			32		
Carbapenem-NS		75.0	4.8		80.4	0.0		78.6	3.0		75.0	0.0
Select Enterobacterales²	1,135			836			1,163			731		
Carbapenem-resistant (CRE)		71.8	0.5		79.7	2.9		81.3	3.7		77.3	1.1
<i><u>Serious Threats</u></i>												
Select Enterobacterales³	946			547			957			546		
Extended-spectrum cephalosporin-NS		83.1	10.4		87.4	24.3		88.5	34.9		87.0	20.2
<i>Enterobacter</i> spp.	167			275			193			171		
Cefepime-NS		71.9	0.8		81.8	13.3		72.5	16.4		78.9	8.1
<i>Enterococcus faecalis</i>	511			553			225			238		
Vancomycin-resistant (VRE)		89.6	0.2		87.5	0.0		80.9	1.1		84.5	0.0
<i>Enterococcus faecium</i>	22			109			130			49		
Vancomycin-resistant (VRE)		90.9	5.0		92.7	21.8		90.0	37.6		93.9	30.4
<i>Pseudomonas aeruginosa</i>	144			178			217			97		
Multidrug-resistant (MDR)		81.3	1.7		88.2	9.6		90.8	8.1		95.9	5.4
<i>Staphylococcus aureus</i>	1,346			511			281			324		
Meth/ox/cefox - resistant (MRSA)		87.0	28.6		85.3	27.3		82.9	33.5		82.7	32.1

Note: Refer to [Technical Resources](#) for more information about phenotype definitions, acronyms, and terms used in this table.

Footnotes (Table P8):

1. As classified by [CDC's 2022 Special Report: COVID-19 U.S. Impact on Antimicrobial Resistance](#)
2. Consists of *E.coli*, *Klebsiella oxytoca*, *Klebsiella pneumoniae*, *Klebsiella aerogenes*, and *Enterobacter* spp.
3. Consists of *E.coli*, *Klebsiella oxytoca*, and *Klebsiella pneumoniae*.

Table P9. Percent of CAUTI Pathogens That Were Resistant to Selected Antimicrobials and Classified as "Urgent" or "Serious" Antimicrobial Resistant Threats¹, Pediatrics, 2018-2021

Pathogen, Antimicrobial Phenotype	All Reporting Facilities and Locations		
	# Reported	% Tested	%R
<i>Urgent Threats</i>			
<i>Acinetobacter</i> spp.	8		
Carbapenem-NS		.	.
Select Enterobacterales²	796		
Carbapenem-resistant (CRE)		76.1	1.0
<i>Serious Threats</i>			
Select Enterobacterales³	689		
Extended-spectrum cephalosporin-NS		89.8	27.6
<i>Enterobacter</i> spp.	99		
Cefepime-NS		78.8	16.7
<i>Enterococcus faecalis</i>	195		
Vancomycin-resistant (VRE)		85.6	1.2
<i>Enterococcus faecium</i>	28		
Vancomycin-resistant (VRE)		85.7	29.2
<i>Pseudomonas aeruginosa</i>	328		
Multidrug-resistant (MDR)		92.7	5.3
<i>Staphylococcus aureus</i>	32		
Meth/ox/cefox - resistant (MRSA)		87.5	50.0

Note: Percent resistance is not calculated when the number of tested isolates is < 20. Refer to [Technical Resources](#) for more information about phenotype definitions, acronyms, and terms used in this table.

Footnotes:

1. As classified by [CDC's 2022 Special Report: COVID-19 U.S. Impact on Antimicrobial Resistance](#)
2. Consists of *E.coli*, *Klebsiella oxytoca*, *Klebsiella pneumoniae*, *Klebsiella aerogenes*, and *Enterobacter* spp.
3. Consists of *E.coli*, *Klebsiella oxytoca*, and *Klebsiella pneumoniae*.

Table P10. Percent of SSI Pathogens That Were Resistant to Selected Antimicrobials and Classified as "Urgent" or "Serious" Antimicrobial Resistant Threats¹ for High-volume Surgical Categories², Pediatrics, 2018-2021

	All Surgery Types			Abdominal			Orthopedic			Neurosurgical			Cardiac		
Pathogen, Antimicrobial Phenotype	# Reported	% Tested	%R	# Reported	% Tested	%R	# Reported	% Tested	%R	# Reported	% Tested	%R	# Reported	% Tested	%R
<i>Urgent Threats</i>															
Acinetobacter spp.	20			2			3			11			2		
Carbapenem-NS		.	.		.	.		.	.		.	.		.	.
Select Enterobacterales³	1,386			1,014			223			105			32		
Carbapenem-resistant (CRE)		75.6	1.0		75.5	1.2		71.7	0.6		82.9	0.0		78.1	0.0
<i>Serious Threats</i>															
Select Enterobacterales⁴	1,079			834			152			69			15		
Extended-spectrum cephalosporin-NS		86.2	17.0		85.3	17.4		85.5	17.7		95.7	7.6		.	.
Enterobacter spp.	286			169			64			33			17		
Cefepime-NS		83.9	9.2		84.0	9.9		82.8	7.5		78.8	7.7		.	.
Enterococcus faecalis	306			235			21			21			25		
Vancomycin-resistant (VRE)		86.9	0.0		88.1	0.0		.	.		.	.		80.0	0.0
Enterococcus faecium	62			54			7			1			0		
Vancomycin-resistant (VRE)		90.3	12.5		90.7	10.2		.	.		.	.		.	.
Pseudomonas aeruginosa	449			253			100			64			26		
Multidrug-resistant (MDR)		95.5	1.4		98.4	1.6		96.0	2.1		87.5	0.0		88.5	0.0
Staphylococcus aureus	891			220			273			202			171		
Meth/ox/cefox - resistant (MRSA)		86.6	25.4		90.5	32.7		86.1	19.6		83.7	29.0		84.8	17.2

Note: Percent resistance is not calculated when the number of tested isolates is < 20. Refer to [Technical Resources](#) for more information about phenotype definitions, acronyms, and terms used in this table.

Footnotes (Table P10):

- 1. As classified by [CDC's 2022 Special Report: COVID-19 U.S. Impact on Antimicrobial Resistance](#)
- 2. The top 4 surgical categories by pathogen volume are shown in this table. "All surgery types" consists of all NHSN procedures combined and is not limited to the 4 categories shown in the table. Refer to CDC's [Antibiotic Resistance & Patient Safety Portal](#) for antimicrobial resistance data for each NHSN procedure code.
- 3. Consists of *E.coli*, *Klebsiella oxytoca*, *Klebsiella pneumoniae*, *Klebsiella aerogenes*, and *Enterobacter* spp.
- 4. Consists of *E.coli*, *Klebsiella oxytoca*, and *Klebsiella pneumoniae*.