UK Health Security Agency

Laboratory surveillance of fungaemia due to yeasts in England: 2024

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Contents

Introduction

Several taxonomic revisions to species previously classified in *Candida* have been implemented in the period covered by this Health Protection Report (HPR) (1). The focus has therefore shifted from candidaemia in previous years to include bloodstream infections due to *Candida* and other yeast species (as listed in the data tables associated with this report) and will continue to evolve while the taxonomy of this group becomes more clearly defined. Bloodstream infections due to all yeast species included within this report will be referred to as fungaemia.

The analyses in this report are based on data relating to diagnoses of bloodstream infections due to yeasts between 2015 and 2024 in England. Data for England was extracted from the UK Health Security Agency's Second Generation Surveillance System (SGSS), a voluntary surveillance database, on 8 April 2025. In England, laboratories are requested to submit data individually to SGSS, with reporting based on clinically relevant isolates.

It should be noted that the data presented here for earlier years may differ from that in previous fungaemia publications due to the inclusion of late reports. The COVID-19 pandemic affected the general case-mix of hospital patients during much of 2020; this has likely impacted any trends reported here.

The report includes analyses on the trends, age and sex distribution, geographical distribution and antifungal susceptibility of laboratory-reported cases of fungaemia due to yeast species. Rates of fungaemia were calculated using mid-year resident population estimates for the respective year and geography. Geographical analyses were based on cases in England being assigned to 1 of 9 regions formed from administrative local authority boundaries.

A web appendix is available featuring the findings of this report.

Main points

Key findings from this report:

- between 2023 and 2024 there was a 4% increase in the number of laboratory reports of fungaemia due to yeasts (from 2,170 to 2,247 reports) in England
- *C. albicans* was the most commonly reported cause of fungaemia in 2024, followed by *N. glabratus* (previously known as *Candida glabrata*) and *C. parapsilosis* respectively
- reports of fungaemia due to *C. auris* in England remain low, though reports have increased following a decline during COVID-19 restrictions
- in 2024, the rate of bloodstream infections due to yeasts across England had increased by 31% since 2015 and by 4% from 2023
- in contrast to many pathogens, the overall rate of bloodstream infections due to yeasts increased over the COVID-19 pandemic period (2020 to 2021)
- rates of bloodstream infections due to yeasts varied by region and by patient ethnicity
- rates of bloodstream infections due to yeasts are higher in more deprived populations of the country than the least deprived (5.0 and 3.2 per 100,000 population respectively)
- rates of fungaemia due to *C. albicans* and *N. glabratus* were highest in the eldest of the population, while rates due to *C. parapsilosis* were highest in the youngest of the population

Trends in England

Overall, there was an 4% increase in the number of laboratory reports of fungaemia due to yeasts between 2023 and 2024 (2,170 to 2,247 reports, Table 1). In 2024, 66% (1,475 out of 2,247) of yeast isolates from blood were *Candida spp.*, of these 62% (909 out of 1,475) were *C. albicans*. As mentioned in the introduction to this report, the proportion of bloodstream infections due to *Candida* has changed in comparison to previous reports due to the reclassification of some yeast species from this genus. The second most common genus of yeast isolated from blood was *Nakaseomyces spp.* (27%; 613 out of 2,247 isolates), all were identified as *N. glabratus*. Thirteen other genera of yeast were reported to have caused bloodstream infections, however each had fewer than 40 (<1.8%) reports in 2024. In 2024, 6% (136 out of 2,247) of yeast isolates from blood were reported to species level, which is higher compared to 2023 (4%; Table 1). Not identifying yeast to species level could mean that there is insufficient evidence to accurately assign isolates to a specific genus (for example *Candida* spp.).

Figure 1 shows the rate per 100,000 population trends of total fungaemia due to yeasts and fungaemia due to *Candida* and *Nakaseomyces* genera between 2015 and 2024. In 2024, the rate of BSI due to yeast across England was 3.9 per 100,000 population, which represents an increase of 31% since 2015 and an increase of 4% from 2023 (Figure 1, a full list of documented species is included within the data tables). This is the highest rate observed in the last 10 years.

The observed increase in BSI due to yeast from 2015 to 2017 may be due to increased reporting following the launch of the Second Generation Surveillance System (SGSS), and associated training for local laboratories, in 2014, adoption of new laboratory testing methods such as MALDI-TOF which facilitate identification of fungal species, raised awareness following the publication of the British Society for Medical Mycology (BSMM) guidance in 2015 and the widely reported *Candida auris* (now named *Candidozyma auris*) outbreaks within hospitals in 2015 and 2016 (3).

In contrast to many pathogens, the rate of bloodstream infections due to yeasts increased over the COVID-19 pandemic period (2020 to 2021). The increase in incidence may be due to increased number of patients being admitted to intensive care units (ICUs) in 2020, as a result of the pandemic (4). Patients on ICUs are at higher risk for BSI due to yeast as the setting allows the opportunistic pathogen to become invasive, with many risk factors for fungaemia overlapping with characteristics of patients on ICUs (5).

Table 1. Reports of fungaemia by yeast species in England, 2020 to 2024

Species	2020		2021		2022		2023		2024	
	Number	%	Number	%	Number	%	Number	%	Number	%
Candida	**1311**	(100)	**1387**	(100)	**1404**	(100)	**1431**	(100)	**1475**	(100)
C. albicans	865	(66)	874	(63)	853	(61)	862	(60)	909	(62)
C. dubliniensis	40	(3)	51	(4)	62	(4)	60	(4)	57	(4)
C. metapsilosis	2	(<1)	4	(<1)	6	(<1)	5	(<1)	7	(<1)
C. orthopsilosis	1	(<1)	2	(<1)	3	(<1)	2	(<1)	3	(<1)
C. parapsilosis	219	(17)	274	(20)	261	(19)	278	(19)	280	(19)
C. tropicalis	52	(4)	45	(3)	79	(6)	75	(5)	80	(5)
Candida spp., sp. not recorded	113	(9)	122	(9)	125	(9)	131	(9)	117	(8)
Candida spp., other named	19	(1)	15	(1)	15	(1)	20	(1)	22	(1)
Candidozyma	**1**	(100)	**4**	(100)	**1**	(100)	**5**	(100)	**2**	(100)
C. auris ¥	1	(100)	4	(100)	1	(100)	5	(100)	2	(100)
Clavispora	**28**	(100)	**38**	(100)	**33**	(100)	**27**	(100)	**34**	(100)
C. lusitaniae ¥	28	(100)	38	(100)	33	(100)	27	(100)	34	(100)
Cryptococcus	**25**	(100)	**33**	(100)	**26**	(100)	**28**	(100)	**34**	(100)
C. neoformans	19	(76)	18	(55)	20	(77)	19	(68)	22	(65)
Cryptococcus spp., sp. not recorded	6	(24)	15	(45)	6	(23)	9	(32)	12	(35)

Kluveromyces	**4**	(100)	**11**	(100)	**10**	(100)	**10**	(100)	**9**	(100)
K. marxianus ¥	4	(100)	11	(100)	10	(100)	10	(100)	9	(100)

Meyerozyma	**16**	(100)	**13**	(100)	**20**	(100)	**20**	(100)	**19**	(100)
M. caribbica	0	(0)	1	(8)	0	(0)	1	(5)	2	(11)
M. guilliermondii ¥	16	(100)	12	(92)	20	(100)	19	(95)	17	(89)

Nakaseomyces	**465**	(100)	**470**	(100)	**552**	(100)	**576**	(100)	**613**	(100)
N. glabratus ¥	463	(>100)	469	(>100)	552	(100)	576	(100)	611	(>100)
N. nivariensis ¥	2	(<1)	1	(<1)	0	(0)	0	(0)	2	(<1)

Nakazawaea	**1**	(100)	**0**		**0**		**0**		**0**	
N. peltate ¥	1	(100)	0		0		0		0	

Pichia	**18**	(100)	**32**	(100)	**28**	(100)	**44**	(100)	**33**	(100)
P. cactophila ¥	0	(0)	0	(0)	1	(4)	0	(0)	0	(0)
P. jadinii ¥	0	(0)	1	(3)	0	(0)	0	(0)	0	(0)
P. kudriavzevii ¥	18	(100)	29	(91)	26	(93)	41	(93)	31	(94)
P. norvegensis ¥	0	(0)	1	(3)	0	(0)	0	(0)	0	(0)
Pichia spp., sp. not recorded	0	(0)	1	(3)	1	(4)	3	(7)	2	(6)

Rhodotorula	**24**	(100)	**13**	(100)	**23**	(100)	**16**	(100)	**22**	(100)
R. dairenensis	0	(0)	0	(0)	2	(9)	1	(6)	0	(0)
R. glutinis	0	(0)	1	(8)	1	(4)	0	(0)	0	(0)
R. mucilaginosa	9	(38)	7	(54)	8	(35)	8	(50)	12	(55)
Rhodotorula spp., other named	7	(29)	2	(15)	6	(26)	3	(19)	5	(23)
Rhodotorula spp., sp. not recorded	8	(33)	3	(23)	6	(26)	4	(25)	5	(23)

Saccharomyces	**6**	(100)	**7**	(100)	**11**	(100)	**10**	(100)	**5**	(100)
S. cerevisiae	6	(100)	7	(100)	10	(91)	10	(100)	5	(100)
Saccharomyces spp., sp. not recorded	0	(0)	0	(0)	1	(9)	0	(0)	0	(0)

Starmerella	**1**	(100)	**0**		**0**		**1**	(100)	**0**	
S. magnoliae ¥	1	(100)	0		0		1	(100)	0	

Tardiomyces	**0**		**0**		**0**		**0**		**1**	(100)
T. blankii ¥	0		0		0		0		1	(100)

Wickerhamomyces	**1**	(100)	**0**		**1**	(100)	**2**	(100)	**0**	
W. anomalus ^	1	(100)	0		1	(100)	2	(100)	0	

¥ Previously categorised as *Candida* species. For a full list of included yeast species and any taxonomic changes please see the accompanying data tables

^ Previously categorised as *Pichia anomola*

Figure 1. Trends in fungaemia reports per 100,000 population in England, 2015 to 2024

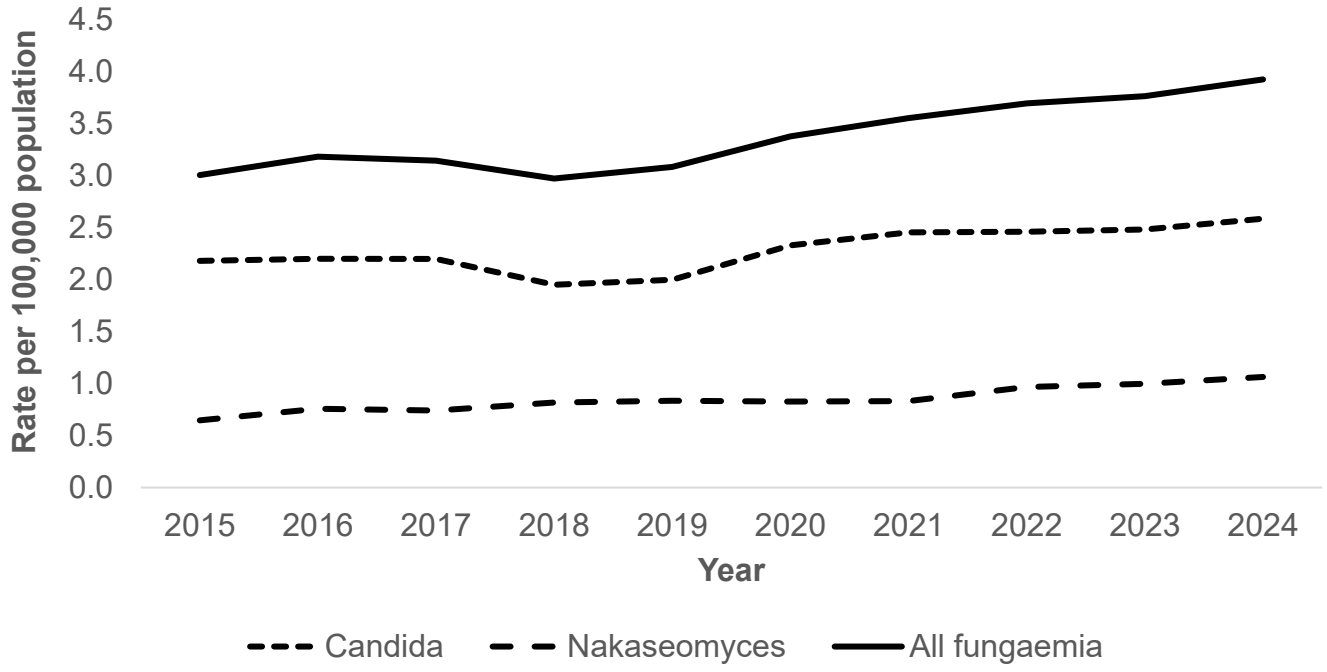


Table 2 shows the regional rates of fungaemia due to yeast by group in 2024.

Table 2. Rate per 100,000 population of fungaemia reports by region in England, 2024

Region		Rate per 100,000 population		
		All fungaemia	*Candida*	*Nakaseomyces*
North of England	North East	4.0	2.8	1.1
	North West	4.6	3.0	1.1
	Yorkshire and Humber	3.4	2.2	0.8
Midlands and East of England	East Midlands	4.0	3.0	0.9
	East of England	3.9	2.4	1.3
	West Midlands	4.0	2.7	1.0
London	London	4.2	2.6	1.2
South of England	South East	3.1	1.9	1.0
	South West	4.0	2.6	1.1
England		**3.9**	**2.6**	**1.1**

The rate of fungaemia caused by yeasts reported across England in 2024 ranged from 4.6 in the North West to 3.1 per 100,000 in the South East (Table 2). Variation in fungaemia due to yeast in 2024 is reported by ethnic group (Table 3). The highest number and rate per 100,000 population of fungaemia was recorded in people in a white ethnic group. In 2024, the incidence of fungaemia increased as deprivation increased from 3.2 per 100,000 in the least deprived 20% to 5.0 per 100,000 in the most deprived 20% of the population in England (Table 4).

Table 3 shows the number of reports and rates of fungaemia by ethnic group in 2024.

Table 3. Fungaemia reports by ethnic group in England in 2024*

Ethnic group	BSI per 100,000 ethnic population					
	All fungaemia		*Candida*		*Nakaseomyces*	
	Number	Rate	Number	Rate	Number	Rate
White	1,731	3.8	1138	2.5	507	1.1
Asian or Asian British	119	2.2	83	1.5	23	0.4
Black, African, Caribbean or black British	81	3.4	48	2.0	27	1.1
Mixed or multiple ethnic groups	25	1.5	15	0.9	7	0.4
Any other ethnic group	7	0.6	2	0.2	4	0.3
Not known or Not stated	24		16		6	

* 260 (11.6%) BSI episodes could not be linked to ethnic group information.

Table 4 shows rates of fungaemia by Indices of Multiple Deprivation (IMD) quintile in 2024.

Table 4. Fungaemia rate per 100,000 population by IMD quintile, England, 2024

IMD Quintile	Rate per 100,000 population		
	All fungaemia	*Candida*	*Nakaseomyces*
1 (most deprived)	5.0	3.4	1.2
2	4.5	2.9	1.3
3	3.8	2.5	1.0
4	3.9	2.5	1.1
5 (least deprived)	3.2	2.1	1.0

*Data for IMD is based on the patient residence information; records are excluded when this information is not available. In 2024, the number of records excluded was 56/2247 (2.5%).

Candida

Candida is the most commonly reported cause of fungaemia in the period 2020-2024. Of the *Candida* causing fungaemia in England in 2024, *C. albicans* accounted for 62% (909 out of 1,475) of reports (Table 1). In comparison with other causes of bloodstream infections, *C. albicans* was ranked 22nd among monomicrobial and 36th among polymicrobial bloodstream infections in 2023 (6), unchanged and down from 31st respectively in 2022. The second most common *Candida* species isolated from blood was *C. parapsilosis* which accounted for 19% (280 out of 1,491) of reports (Table 1).

C. auris (recently re-classified as *Candidozyma auris*) is a fungal pathogen of clinical concern. Reports of fungaemia due to *C. auris* in England remain low, though reports have increased following a decline during COVID-19 restrictions (one report in 2020 to 5 reports in 2023, Table 1). More detailed epidemiology on *C. auris* can be found in a recent UKHSA Health Protection Report and updated guidance for healthcare professionals can be found through the Government *C. auris* collection page (7, 8).

The rate of fungaemia due to *Candida* across England in 2024 ranged from 2.8 in the North East to 1.9 per 100,000 in the South East (Table 2). There was variation in *Candida* bloodstream infections by ethnic group in 2024, similar to that found overall for fungaemia (Table 3). The highest number of reports and rate per 100,000 population of fungaemia due to *Candida* was recorded in people in a white ethnic group.

In 2024, the incidence of fungaemia due to *Candida* increased as deprivation increased from 2.1 per 100,000 in the least deprived 20% to 3.4 per 100,000 in the most deprived 20% of the population in England, this trend mirrors that for all fungaemia (Table 4). There was a 62% increase in the rate of fungaemia due to *Candida* between the least and most deprived populations.

Figure 2 shows that the highest rate of *C. albicans* bloodstream infections was in those aged 75 and over at 5.7 per 100,000 (9.1 in males and 3.1 per 100,000 in females), followed by children aged under one year at 4.0 per 100,000 (3.7 in males and 4.3 per 100,000 in females). Rates of *C. albicans* bloodstream infections were higher in males than females except in the under one year and 15-to-44 year age groups.

Figure 3 shows the highest rate of *C. parapsilosis* bloodstream infections was in children aged less than one year at 1.4 per 100,000 (1.4 per 100,000 in both males and females), followed by those aged 75 and over at 1.1 per 100,000 population. Rates of *C. parapsilosis* bloodstream infections were higher in males than females except in the under one year and 10-to-14-year age groups.

Figure 2. *Candida albicans* bloodstream infections age and sex rates per 100,000 population in England, 2024

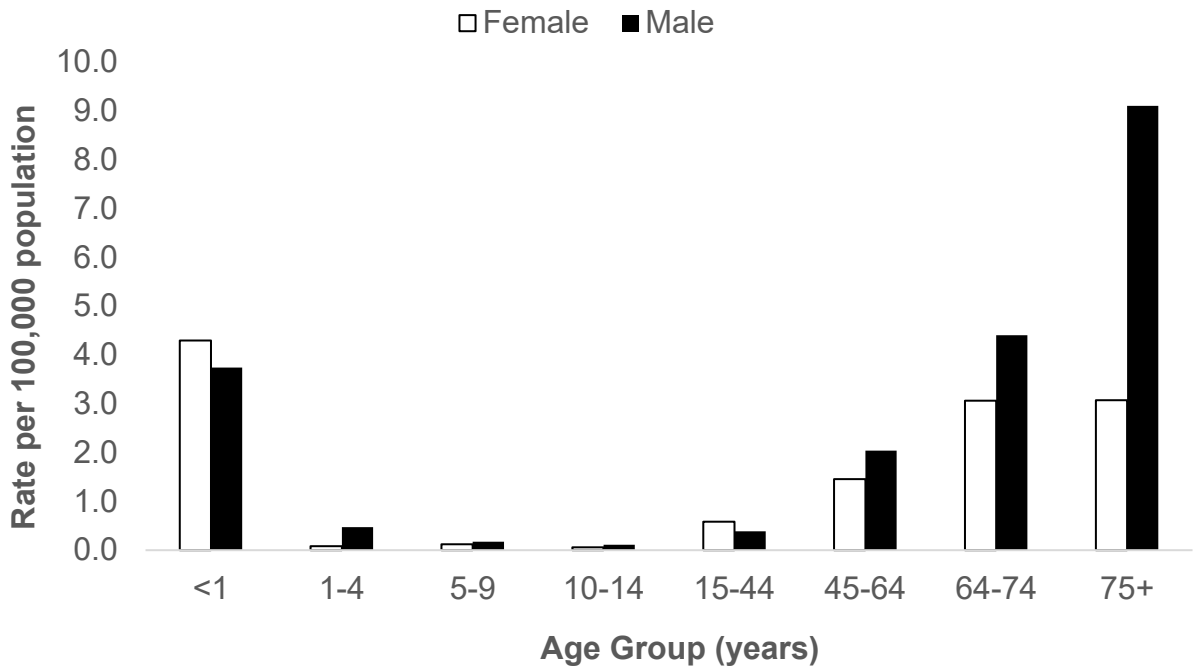
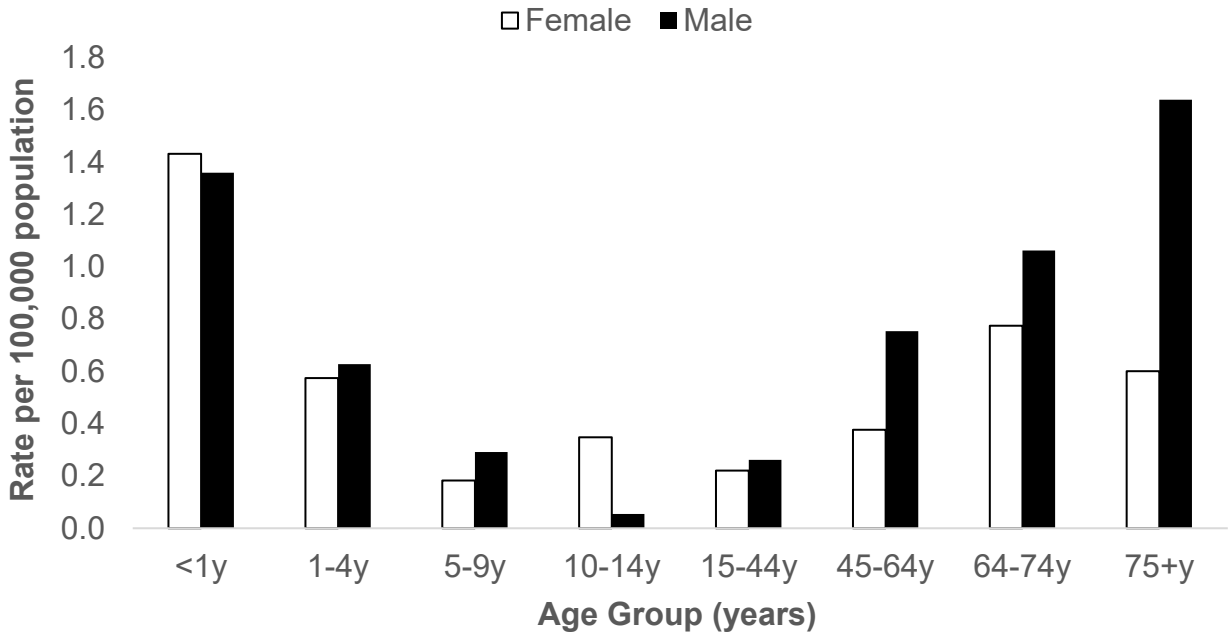


Figure 3. *Candida parapsilosis* bloodstream infections age and sex rates per 100,000 population in England, 2024



In England, the percentage of *C. albicans* fungaemia reports that were accompanied by antifungal susceptibility data in 2024 was 54% (52% in 2023), 47% (44%), 68% (62%), 11% (17%) and 53% (50%) for amphotericin B, caspofungin, fluconazole, flucytosine and voriconazole respectively. In 2024, resistance to each of the listed antifungals was 2% or less.

The percentage of *C. parapsilosis* fungaemia reports that were accompanied by antifungal susceptibility data in 2024 was 60% (48% in 2023), 49% (37%), 66% (53%), 11% (19%) and 62% (52%) for amphotericin B, caspofungin, fluconazole, flucytosine and voriconazole respectively. In 2023, resistance to each of the listed antifungals was 2% or less with the exception of flucytosine for which resistance was 3%. This should be monitored as there are increasing reports of fluconazole resistant *C. parapsilosis* from countries such as Spain, Italy, Turkey, South America and South Africa (9).

Resistance data displayed in this report is as provided by laboratories in England to SGSS, the methodology by which susceptibility testing was performed is not captured. The European Committee on Antimicrobial Susceptibility Testing (EUCAST) and Clinical and Laboratory Standards Institute (CLSI) resistance breakpoints differ and the correct cut-off should be selected by laboratories according to the susceptibility method used.

British and European guidelines on fungal diagnostics and management (10, 11) emphasise the role of rapid diagnosis and identification of clinically significant fungal isolates to species level, as well as the need for susceptibility testing. Further increases in the levels of antifungal susceptibility testing are needed to improve our understanding of resistance trends, inform antifungal stewardship activities and improve patient outcomes for yeast species bloodstream infections. However, there is an increasing literature that provides the usual antifungal susceptibility patterns for many species of *Candida* and allied genera that may help to inform therapeutic decisions (12).

Table 5 shows the number of reports for prevalent *Candida* species causing fungaemia that were tested and the proportion that were resistant to key antifungals (amphotericin B, anidulafungin, caspofungin, fluconazole, flucytosine, voriconazole) in England between 2020 and 2024.

Table 5. Antimicrobial susceptibility for *Candida* causing fungaemia in England, 2020 to 2024

In this table, R = resistant

Antimicrobial agent		2020		2021		2022		2023		2024	
		Number tested	R (%)	Number tested	R (%)	Number tested	R (%)	Number tested	R (%)	Number tested	R (%)
Candida albicans	amphotericin B	476	(<1)	501	(<1)	491	(<1)	449	(<1)	490	(<1)
	caspofungin	403	(<1)	418	(<1)	404	(0)	384	(0)	430	(<1)
	fluconazole	544	(<1)	543	(<1)	533	(1)	541	(1)	618	(2)
	flucytosine	291	(3)	276	(2)	247	(2)	143	(2)	101	(2)
	voriconazole	481	(2)	503	(1)	477	(1)	431	(1)	485	(1)
Candida parapsilosis	amphotericin B	138	(<1)	166	(0)	181	(1)	161	(<1)	168	(<1)
	caspofungin	119	(0)	129	(0)	125	(<1)	121	(<1)	138	(<1)
	fluconazole	153	(1)	177	(5)	175	(2)	162	(5)	185	(2)
	flucytosine	82	(0)	89	(2)	82	(0)	62	(2)	32	(3)
	voriconazole	144	(0)	168	(2)	169	(<1)	162	(2)	174	(<1)

Nakaseomyces

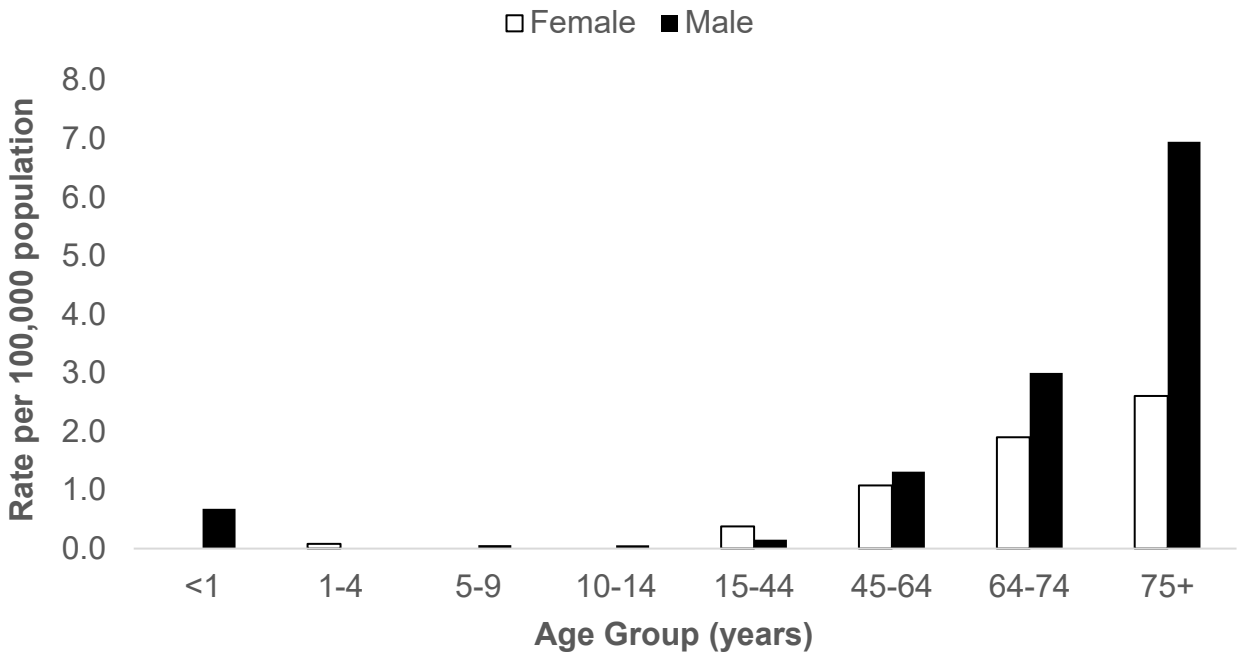
Nakaseomyces are the second most commonly reported cause of fungaemia in the period 2020 to 2024. Of the *Nakaseomyces spp.* causing fungaemia in England in 2024, *N. glabratus* accounted for 611 reports (Table 1). In comparison with other causes of bloodstream infections, *N. glabratus* was ranked 33rd among monomicrobial and 43rd among polymicrobial bloodstream infections in 2023 (6), down from 31st and 39th respectively in 2022.

The rate of *Nakaseomyces* reports across England in 2024 ranged from 1.3 in the East of England to 0.8 per 100,000 in Yorkshire and Humber (Table 2). Similarly to *Candida*, there was variation in fungaemia due to *Nakaseomyces spp*. by ethnic group in 2024 (Table 3). The highest number of reports of fungaemia due to *Nakaseomyces* was recorded in people in a white ethnic group. The highest rate per 100,000 population of fungaemia due to *Nakaseomyces* was recorded in people in a white and a black ethnic group.

In 2024, the incidence of fungaemia due to *Nakaseomyces* was highest in the most deprived 40% of the population (1.2 and 1.3 per 100,000 population in IMD quintiles 1 and 2 respectively, Table 4). The incidence decreased to 1.0-1.1 in the 60% least deprived of the population (IMD quintiles 3-5). There was a 20% increase in the rate of fungaemia between the least and most deprived populations.

Figure 4 shows the highest rate of *N. glabratus* fungaemia was in people aged 75 years and over at 4.5 per 100,000 (6.9 in males and 2.6 per 100,000 in females), followed by those aged 64 to 74 and 45 to 64 at 2.4 per 100,000 and 1.2 per 100,000, respectively.

Figure 4. *Nakaseomyces glabratus* fungaemia age and sex rates per 100,000 population in England, 2024



In England, the percentage of *N. glabratus* fungaemia reports that were accompanied by antifungal susceptibility data in 2024 was 58% (55% in 2023), 36% (40%), 54% (46%), 10% (17%) and 42% (36%) for amphotericin B, caspofungin, fluconazole, flucytosine and voriconazole respectively. In 2024, resistance to fluconazole and voriconazole was 14% and 13% respectively. Resistance to amphotericin B, caspofungin and flucytosine was <1%, 2% and 2% respectively.

Interpreting resistance trends in *N. glabratus* has been difficult due to differences in the standard breakpoints used by laboratories to define antifungal susceptibility. EUCAST and CLSI breakpoints for fluconazole previously differed in their interpretation. However, introduction of the EUCAST ‘Susceptible Increased exposure’ category now aligns more closely with the CLSI ‘susceptible-dose-dependent’ category (indicating that the isolate is likely to respond to high doses of fluconazole) (13, 14); this could account for changes in the percentage of isolates being reported as resistant to fluconazole (Table 7). The EUCAST methodology does not currently have a *N. glabratus* breakpoint for voriconazole, due to insufficient evidence that this antifungal should be used in the treatment of *N. glabratus* (15). Furthermore, for caspofungin susceptibility testing, only the Etest method is reliable, which requires expertise to read; many laboratories are changing to anidulafungin as a sentinel echinocandin instead, as resistance mutations in most yeast isolates confer resistance to all drugs in the echinocandin class (16).

Table 7 shows the number of *Nakaseomyces glabratus* causing fungaemia that were tested and the proportion that were resistant to key antifungals (amphotericin B, anidulafungin, caspofungin, fluconazole, flucytosine, voriconazole) in England between 2020 and 2024.

Table 6. Antimicrobial susceptibility for *Nakaseomyces* causing fungaemia in England, 2020 to 2024

In this table, R = resistant

Antimicrobial agent		2020		2021		2022		2023		2024	
		Number tested	R (%)	Number tested	R (%)	Number tested	R (%)	Number tested	R (%)	Number tested	R (%)
Nakaseomyces glabratus	amphotericin B	300	(<1)	284	(0)	349	(2)	333	(2)	357	(<1)
	caspofungin	191	(8)	168	(12)	237	(5)	243	(7)	217	(2)
	fluconazole	200	(9)	200	(10)	283	(17)	288	(17)	332	(14)
	flucytosine	167	(0)	161	(<1)	161	(1)	96	(5)	60	(2)
	voriconazole	241	(11)	231	(12)	247	(19)	208	(21)	255	(13)

Reference microbiology service

In 2024, the percentage of reports of fungaemia due to yeast in which the organism was not fully identified was 6%. Precise species identification of isolates would improve the monitoring of trends in infections due to yeast genera. The percentage of fungaemia reports that were accompanied by antifungal susceptibility data in 2024 is far lower than for bacteraemia reports (6), highlighting the need for development and implementation of testing within the NHS.

The UKHSA Mycology Reference Laboratory (MRL, Bristol) offers referred (charged for) taxonomic identification and susceptibility testing services for fungi from systemic and other significant infections (17).

Acknowledgements

These reports would not be possible without the weekly contributions from microbiology colleagues in laboratories across England, without whom there would be no surveillance data. The support from colleagues within the UKHSA Mycology Reference Laboratory (MRL, Bristol) is greatly valued in the preparation of the report. Feedback and specific queries about this report are welcome and can be sent to hcai.amrdepartment@ukhsa.gov.uk

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The UK Health Security Agency (UKHSA) prevents, prepares for and responds to infectious diseases, and environmental hazards, to keep all our communities safe, save lives and protect livelihoods. We provide scientific and operational leadership, working with local, national and international partners to protect the public's health and build the nation's health security capability.

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