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Evaluation of antifungal use in long-term care facilities using pharmacy dispensing data in the USA, 2019

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Antimicrobials are one of the most commonly prescribed medications in long-term care (LTC) settings.[1–3] Cross-sectional surveys have estimated that antifungals account for 0.1%–5% of antimicrobials administered to LTC residents.[2,3] However, these prevalence surveys did not capture use over time or characterize the prescribing of specific agents. Dispensing data from LTC pharmacies can be leveraged to track and report LTC antimicrobial use.[4] Due to the risk of adverse events and drug interactions among older adults, characterizing antifungal use and describing variability in antifungal prescribing can inform antimicrobial stewardship efforts to ensure resident safety.[5–7]

We conducted a descriptive, retrospective analysis of antifungal prescriptions dispensed by PharMerica, a BrightSpring Health Services company (https://pharmerica.com/) that services long-term and post-acute care facilities, including skilled nursing facilities, nursing homes, assisted living facilities, group homes and intermediate care facilities during January to December 2019. Antifungals with oral and intravenous (IV) routes of administration were identified through American Hospital Formulary Service drug classification codes. LTC facilities that reported census data for each month of the study period with ≥1 resident-day per month and ≥5 months of dispensing data were included. Dispense-level data included resident and facility identifiers, antifungal agent, route of administration, date and days supplied. Course end dates were calculated from the prescription days supply. We defined a course as a unique antifungal dispense event. When the end date of one antifungal course was ≤3 days from a subsequent start date of a course of the same agent, we combined these courses into a single discrete course. Days of therapy (DOT) of a discrete course were calculated as the difference between the calculated end date and the initial dispense date. We reported antifungal use as total number of courses and course duration stratified by antifungal agent as well as the proportion of antifungal courses with a preceding antibiotic course within the previous 30 days. We also calculated facility-level rates as number of

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courses per resident and DOT per 1000 resident-days and stratified by facility location based on US census region (https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf). All analyses were conducted using SAS software version 9.4 (SAS Institute, Cary, NC, USA).

In 2019, 22 341 (5.3%) LTC residents in 1699 facilities were prescribed an antifungal course of therapy at a rate of 71.3 courses per 1000 residents (Table 1). Of those residents, 21% (4735/22 341) received more than one course. Among residents who were dispensed at least one antifungal, 15 123 (67.7%) were female and 11 936 (53.3%) residents were ≥75 years of age. The most common route of administration was oral (99.0%), and the most commonly dispensed agents were fluconazole (67.6%) and nystatin (29.4%). The median course duration was 7 [Interquartile Range (IQR) 3–11] days (Table 1). Only 575 (1.9%) antifungal courses were longer than 42 days; however, these courses comprised 45 081 (15.2%) of total DOT. Of all antifungal courses, 45% were started within 30 days of an antibiotic prescription, with 16% initiated on the same day as the antibiotic course.

At the facility level, the median course rate was 65.3 (IQR 36.4–101.9) courses per 1000 residents. The median facility-level rate was 4.1 (IQR 1.7–7.7) DOT per 1000 resident-days. The highest median facility-level rate of DOT per 1000 resident-days was found in the South [5.0 (IQR 2.5–8.6)] and Midwest [4.8 (IQR 2.0–8.3)]. Antifungal use rates in the West and Northeast regions were 3.5 (IQR 1.4–7.4) and 2.7 (IQR 1.1–5.9) DOT per 1000 resident-days, respectively.

This report describes antifungal prescribing practices in a subset of LTC facilities. Similar to inpatient and outpatient settings, fluconazole accounted for the majority of antifungal dispenses, and the rate was higher in the South census region.[8,9] Overall rates of antifungal use in LTC facilities (71.3 courses per 1000 residents) are comparable to outpatient rates (68.4 prescriptions per 1000 persons). The percentage of LTC residents receiving an antifungal (5.3%) was greater than the percentage reported for hospitalized patients (2.7%).[9] Outbreaks of fluconazole-resistant *Candida auris* infections have been reported in high-acuity LTC settings, and recent antibiotic exposure has been associated with *C. auris* infection and colonization.[10] As antibiotic use is considered a risk factor for fungal infections, in this analysis, almost half of antifungal dispenses were associated with a recent antibiotic prescription; further evaluation is needed to determine the indication and appropriateness of antifungal and antibiotic prescribing. In addition to optimizing antibiotic use, antimicrobial stewardship efforts can mitigate risks associated with antifungal use and slow the development of drug-resistant fungal infections. These data can support LTC facilities in tracking and reporting antifungal use to identify opportunities for improvement, especially in facilities serving high-acuity residents.[11] LTC consultant pharmacists provide critical expertise and feedback to prescribers on the appropriate indications, dose and duration of antifungal agents. One important limitation to this analysis is that the indication and appropriateness of prescribing could not be assessed. Only antifungal dispense-level data were collected, so we were unable to compare demographics of those receiving antifungals to the general LTC population. Additionally, these data from a single vendor may not be representative of all LTC facilities. However, this report is the first to characterize

antifungal prescribing practices in a large subset of US LTC facilities and highlights opportunities to optimize prescribing practices as part of antimicrobial stewardship efforts.

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References

1. Nicolle LE, Bentley DW, Garibaldi R et al. Antimicrobial use in long-term-care facilities. SHEA long-term-care committee. Infect Control Hosp Epidemiol 2000; 21: 537–45. 10.1086/501798 [PubMed: 10968724]
2. Pakyz AL, Dwyer LL. Prevalence of antimicrobial use among United States nursing home residents: results from a national survey. Infect Control Hosp Epidemiol 2010; 31: 661–2. 10.1086/653072 [PubMed: 20426578]
3. Thompson ND, Stone ND, Brown CJ et al. Antimicrobial use in a cohort of US nursing homes, 2017. JAMA 2021; 325: 1286–95. 10.1001/jama.2021.2900 [PubMed: 33821897]
4. Song S, Wilson BM, Marek J et al. Use of electronic pharmacy transaction data and website development to assess antibiotic use in nursing homes. BMC Med Inform Decis Mak 2021; 21: 148. 10.1186/s12911-021-01509-7 [PubMed: 33952239]
5. Dwyer LL, Han B, Woodwell DA et al. Polypharmacy in nursing home residents in the United States: results of the 2004 national nursing home survey. Am J Geriatr Pharmacother 2010; 8: 63–72. 10.1016/j.amjopharm.2010.01.001 [PubMed: 20226393]
6. Corsonello A, Abbatecola AM, Fusco S et al. The impact of drug interactions and polypharmacy on antimicrobial therapy in the elderly. Clin Microbiol Infect 2015; 21: 20–6. 10.1016/j.cmi.2014.09.011 [PubMed: 25636922]
7. Kauffman CA. Fungal infections in older adults. Clin Infect Dis 2001; 33: 550–5. 10.1086/322685 [PubMed: 11462194]
8. Benedict K, Tsay S, Bartoces M et al. Outpatient antifungal prescribing patterns in the United States, 2018. Antimicrob Steward Healthc Epidemiol 2021; 1: e68. 10.1017/ash.2021.201
9. Vallabhaneni S, Baggs J, Tsay S et al. Trends in antifungal use in US hospitals, 2006–12. J Antimicrob Chemother 2018; 73: 2867–75. 10.1093/jac/dky270 [PubMed: 30295769]
10. Rossow J, Ostrowsky B, Adams E et al. Factors associated with *Candida auris* colonization and transmission in skilled nursing facilities with ventilator units, New York, 2016–2018. Clin Infect Dis 2021; 72: e753–60. 10.1093/cid/ciaa1462 [PubMed: 32984882]
11. Ashraf MS, Bergman S. The case for consultant pharmacists as key players in nursing home antibiotic stewardship programs. J Am Med Dir Assoc 2021; 22: 6–8. 10.1016/j.jamda.2020.11.029 [PubMed: 33271122]

Table 1.

Antifungal use among 22 341 LTC residents in 1699 facilities, January to December 2019

Antifungal agent	Number of courses *n* (%)		Median (IQR) course duration, days	
Total	29 961		7	(3–11)
Oral route	29 662	(99.0)	7	(3–11)
IV route	299	(1.0)	9	(5–15)
Systemic oral and intravenous agents				
Azoles	20 874	(69.7)	5	(2–10)
Fluconazole	20 265	(67.6)	5	(2–10)
Voriconazole	301	(1.0)	14	(7–30)
Itraconazole	138	(0.5)	15	(8–30)
Ketoconazole	94	(0.3)	14	(7–27)
Posaconazole	56	(0.2)	14	(7–26)
Isavuconazonium sulphate	20	(0.1)	11	(6–21)
Echinocandins	288	(1.0)	9	(5–16)
Micafungin	217	(0.7)	9	(6–15)
Anidulafungin	42	(0.1)	11	(4–21)
Caspofungin	29	(0.1)	10	(5–20)
Non-systemic oral agent				
Nystatin	8799	(29.4)	10	(7–14)

Abbreviation: IQR, Interquartile range.

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