This document describes how we constructed the variables included in the Waves 1 and 2 Nursing Home measures file. The file contains one observation for each nursing home—identified by unique Centers for Medicare & Medicaid Services (CMS) certification number (CCN)—sampled for Waves 1 and 2 Nursing Home Survey. The file contains variables describing characteristics of the facility based primarily on the Minimum Data Set (MDS), Nursing Home Compare (NHC), Brown University's LTCFocus, and Medicare administrative and claims and encounter data. The variables in the file provide information on the characteristics of the facilities as well as their residents, as described below.

Each measure falls into one of five broad categories, specifically:

1. **Facility characteristics.** These variables describe characteristics of the nursing homes—for example, for-profit status, number of certified beds, and whether the facility is in a rural region. These variables also include information on the dementia population in each facility and dementia-specific care, such as the number of residents with dementia and whether the facility has an Alzheimer's disease special care unit. Many of the variables in this section are sourced from publicly available data sources, including CMS's Nursing Home Compare, LTCFocus, and the U.S. Department of Agriculture's (USDA) primary rural-urban commuting area (RUCA) code data for rurality.
2. **Resident demographics and Medicare enrollment characteristics.** These variables describe the nursing homes' residents at a single point in time in the measurement year, specifically the first Thursday in April. This approach is based on methods developed by LTCFocus. As described by LTCFocus, "Research has shown that the nursing home population fluctuates both by season during the year and by day of the week. The nursing home population is highest during the winter months and lowest during the summer months. In addition, we have found that nursing home admissions and discharges fluctuate during each week, with the greatest number of admissions occurring on Mondays and the greatest number of discharges occurring on Fridays. We sought to avoid these issues by calculating all MDS prevalence measures based on the nursing home population on the first Thursday in April each year."[1] The measures in this category cover four overlapping groups of residents. Specifically, we constructed measures to describe the demographic characteristics of (1) the full population of residents; and (2) the subset of residents with dementia. In addition, among Medicare-enrolled residents, we used the Medicare Master Beneficiary Survey File (MBSF) to construct measures of Medicare enrollment characteristics (for example, the number of residents dually enrolled in Medicare and Medicaid) among (3) all residents enrolled in Medicare; and (4) residents with dementia enrolled in Medicare.
3. **Clinical characteristics of residents with dementia.** These measures describe the clinical characteristics of each nursing home's population of residents with dementia on the first Thursday in April of the measurement year. Most of these measures are based on the MDS assessment data—for example, variables that count the number of residents with various

[1] LTCFocus. FAQs, available at: https://ltcfocus.org/about. Last accessed June 11, 2025.

conditions and variables that describe cognitive status, incontinence status, pain, and mean mortality risk score. Among residents with dementia enrolled in Medicare, we also used Medicare fee-for-service (FFS) claims and Medicare Advantage (MA) encounter data (excluding chart review records) to calculate hierarchical condition category (HCC) scores. For the HCC scores, we used FFS claims and MA encounter data in the year prior to the measurement year to ensure that we had adequate claims history, particularly for any residents who died shortly after the first Thursday in April of the measurement year.

4. **Service use among Medicare residents with dementia.** These measures describe the number of acute hospitalizations and outpatient ED visits or observation stays from the nursing home among Medicare-enrolled residents with dementia at any time during the measurement year. (Unlike the measures described above, these are not limited to the population in each nursing home on the first Thursday in April). For these measures, we used Medicare FFS claims and MA encounter data to identify events—acute hospitalizations or outpatient ED visits or observation stays—that occurred on the discharge date of a nursing home stay or otherwise overlapped with a nursing home stay. For both acute hospitalizations and outpatient ED visits and observation stays, we also measured the number that were potentially avoidable.[2]
5. **Part D drug-related variables**. These measures describe Part D prescription drug fills and days' supply among Medicare-enrolled, Part D-covered residents with dementia in each nursing home at any time during the measurement year. For these residents, we measured the total number of Part D-paid claims and total days' supply for each of eight classes of medications, where the claims overlapped with a nursing home stay, except for the discharge date (we excluded claims on the discharge date because the fill might have occurred post-discharge in the community). We searched for Part D fills during any nursing home stay, even though Part A should cover the costs of medications during a Medicare-covered stay for post-acute care. Recent analyses suggest that Part D nonetheless pays for many prescription drug fills during Medicare post-acute care stays.[3]

Table 1 describes the calendar year (CY) MDS and Medicare data used to construct the Nursing Home claims-based file. The measurement year for this file is 2023 and it contains all nursing homes sampled for waves 1 and 2 of the nursing home survey. The wave 1 Nursing Home survey sampled 200 nursing homes

[2] For more information about potentially avoidable hospitalizations and ED visits from the nursing home settings, see: Ouslander, J.G., G. Lamb, M. Perloe, J.H. Givens, L. Kluge, T. Rutland, A. Atherly, and D. Saliba. "Potentially Avoidable Hospitalizations of Nursing Home Residents: Frequency, Causes, and Costs." *Journal of the American Geriatrics Society*, vol. 58, no. 4, 2010, pp. 627–635. Also see: Walsh, E.G., J.M. Wiener, S. Haber, A. Bragg, M. Freiman, and J.G. Ouslander. "Potentially Avoidable Hospitalizations of Dually Eligible Medicare and Medicaid Beneficiaries from Nursing Facility and Home- and Community-Based Services Waiver Programs." *Journal of the American Geriatrics Society*, vol. 60, no. 5, 2012, pp. 821–829. Also, for a publication with a list of ICD-10 diagnosis codes for potentially avoidable hospitalizations, see: Hamasaki, Y., N. Sakata, X. Jin, T. Sugiyama, K. Morita, K. Uda, S. Matsuda, and N. Tamiya. "Facility Staffing Associated with Potentially Avoidable Hospitalizations in Nursing Home Residents in Japan: A Retrospective Cohort Study." *BMC Geriatrics*, vol. 23, 2023, article 566.

[3] See: U.S. Department of Health and Human Services Office of Inspector General. "Medicare Part D Paid Millions for Drugs for Which Payment Was Available Under the Medicare Part A Skilled Nursing Facility Benefit." Report number: A-09-21-03008. Posted on October 22, 2024. Available at: Medicare Part D Paid Millions for Drugs for Which Payment Was Available Under the Medicare Part A Skilled Nursing Facility Benefit | Office of Inspector General | Government Oversight | U.S. Department of Health and Human Serviceshttps://oig.hhs.gov/reports/all/2024/medicare-part-d-paid-millions-for-drugs-for-which-payment-was-available-under-the-medicare-part-a-skilled-nursing-facility-benefit/. Last accessed June 11, 2025.

and wave 2 sampled 1,000 nursing homes. Thus, there are 1,200 records in the combined waves 1 and 2 nursing home claims-based file. In future waves, we will add newly sampled nursing homes and recreate the claims-based file using the most recent MDS and Medicare data available.

Table 1. Data sources and calendar years used to construct the nursing home claims-based files by survey wave

Data sources (in alphabetical order)	Calendar year data used: Wave 2 data release
LTCFocus	2021[a]
MDS	2022 - 2023[b]
Medicare FFS claims and MA encounters for Parts A and B service use	2022 - 2023[b]
Medicare Master Beneficiary Summary File	2023
Medicare Part D drug claims	2023
Nursing Home Compare	2023 – 2024[c]

FFS = fee-for-service; HCC = hierarchical condition category; MA = Medicare Advantage; MDS = Minimum Data Set; NHC = Nursing Home Compare.

Notes: The Wave 2 nursing home claims-based file includes the 200 nursing homes sampled for Wave 1 and 1,000 nursing homes sampled for Wave 2, for a total of 1,200 nursing home records in the file. We did not release a nursing home claims-based file for Wave 1 nursing homes only. For additional information on how we identified the Wave 1 and Wave 2 nursing homes for the survey, please see the NDWS website, here: https://www.ndws.org/sites/default/files/202507/NH%20Wave%201%20Sample%20Frame%20Overview.pdf

[a] This was the most recent year of LTCFocus available when we constructed the Waves 1 and 2 sample frames. Most other characteristics in the claims-based file are based on 2023 data.

[b] The measurement year for the wave 2 release of the Nursing Home claims-based file is 2023. However, we also used MDS data from the prior year (2022) to accurately measure stays that started before the measurement year. We also used Medicare FFS claims and MA encounter data from 2022 to identify dementia and calculate HCC scores on the first Thursday in April of the measurement year.

[c] We used measurement year NHC data to construct several measures that combined MDS and NHC data, for example, to calculate admission and occupancy rates. We used more recent data (2024) for several measures (e.g., profit status) that had been used for Wave 2 sample frame development, which occurred in 2024.

Many measures are counts—for example, the number of residents with dementia with specific conditions and the number of inpatient admissions and emergency department (ED) visits. For end users of this file who prefer to calculate percentages—for example, the percentage of residents with specific conditions—we also provide guidance in Table 2 for which variable to use as the denominator of any percentage calculation.

In the future, we will make available the SAS code for constructing these measures on Linkage.

Table 2. Nursing home characteristics, as defined from MDS, Nursing Home Compare, LTCFocus, Medicare claims, encounters, and enrollment data, and other data sources

Variable name	Variable definition	Source data
Facility characteristics		
PROVIDER_ENCRYPTED	The encrypted CCN for each nursing home created by Acumen	Acumen
WAVE	**The NDWS survey wave in which the nursing home was sampled:** 1 = Wave 1 2 = Wave 2	NDWS
FOR_PROFIT	**The profit status of the nursing home:** = 1 if nursing home is for-profit = 0 otherwise	Nursing Home Compare
TOT_BEDS	**Number of federally certified beds**	Nursing Home Compare
NRESID_ALL	**Number of residents present on the first Thursday in April of the measurement year.** This is the number of residents who had at least one MDS assessment or entry tracking record on or before the first Thursday in April of the measurement year and no discharge assessment before that first Thursday in April. This variable measures the total number of residents in the nursing home, including residents with and without dementia.	MDS
NRESID_MCARE	**Number of residents present on the first Thursday in April of the measurement year who were enrolled in Medicare.** This is the total number of residents in the nursing home on the first Thursday in April of the measurement year, as described above in NRESID_ALL, who were also enrolled in Medicare Part A or Part B in April of the measurement year based on MBSF data (MDCR_ENTLMNT_BUYIN_IND_04 was not equal to 0 [not Medicare enrolled for the month] or missing [not found in the MBSF]).	MDS; MBSF
N_D_RESID	**Number of residents present on the first Thursday in April of the measurement year who had dementia**. Among residents present on the first Thursday in April of the measurement year, this is the number with dementia based on the most recent MDS assessment on or before that first Thursday in April (where I4200_ALZHMR_CD = 1 or I4800_DMNT_CD = 1) or, for Medicare-enrolled residents, based on whether they met the Bynum-Standard criteria[a] for dementia based on FFS claims or MA encounter data (excluding chart review records) in the year before the first Thursday in April of the measurement year. See Appendix Table 1 for a full list of dementia diagnosis codes.	MDS; Medicare FFS and MA inpatient, skilled nursing facility (SNF), outpatient, home health, hospice, and carrier files
N_D_RESID_MCARE	**Number of residents present on the first Thursday in April of the measurement year who had dementia and were enrolled in Medicare.** This is the total number of residents with dementia in the nursing home on the first Thursday in April of the measurement year who were	MDS; MBSF; Medicare FFS and MA inpatient, SNF, outpatient, home health, hospice, and carrier files

Variable name	Variable definition	Source data
	also enrolled in Medicare in April of the measurement year, as described above in NRESID_MCARE.	
N_D_MCARE_RESYRS	**Number of resident years among residents with dementia enrolled in Medicare in the facility.** This is calculated as the total number of resident days in the facility in the measurement year among residents with dementia enrolled in Medicare, divided by 365. Residents with dementia had evidence of dementia on an assessment record (where I4200_ALZHMR_CD = 1 or I4800_DMNT_CD = 1) or, for Medicare-enrolled residents, based on whether they met the Bynum-Standard criteria[a] for dementia based on FFS claims or MA encounter data in the measurement year. Residents enrolled in Medicare had evidence in the MSBF of Part A or Part B coverage anytime in the measurement year (MDCR_ENTLMNT_BUYIN_IND_01 - MDCR_ENTLMNT_BUYIN_IND_12 were not equal to 0 [not Medicare enrolled] or missing [not found in the MBSF]) in all months. This variable is the denominator for the following four measures: (1) number of acute inpatient days from the nursing home per resident year (TOT_D_ACUTE_IP_DAYS); (2) number of acute inpatient days from the nursing home that were potentially avoidable per resident year (TOT_D_PAH_IP_DAYS); (3) number of outpatient ED visits (including observation stays) from the nursing home per resident year (TOT_D_ED_VISITS); and (4) number of outpatient ED visits (including observation stays) from the nursing home that were potentially avoidable per resident year (TOT_D_PAH_ED_VISITS_D), which are described below. This variable can help analysts distinguish zeros in the four measures listed above between facilities with no events (true zeros, where N_D_MCARE_RESYRS > 0) versus facilities with no dementia residents during the year (where N_D_MCARE_RESYRS = 0).	MDS; MBSF; Medicare FFS and MA inpatient, SNF, outpatient, home health, hospice, and carrier files
N_D_MCARE_PTD_RESYRS	**Number of resident years in the facility among Medicare-covered residents with dementia who were enrolled in Part D.** This is calculated as the total number of resident days in the facility in the measurement year among residents with dementia enrolled in Medicare Part D based on the MBSF (PTD_PLAN_CVRG_MONS ≥ 1), divided by 365. This variable can be used as the denominator for the Medicare Part D-related measures to calculate the number of claims (or fills) for specific drugs per Medicare Part D-covered resident with dementia in the year.	MDS; MBSF; Medicare FFS and MA inpatient, SNF, outpatient, home health, hospice, and carrier files
N_D_ADMSN_FROM_HOSP	**The number of facility admissions from acute care hospitals among residents with dementia.** This is the number of nursing home stays for residents with dementia age 55 and older (based on C_RSDNT_AGE_NUM) who were admitted from an acute care hospital (A1800_ENTRD_FROM_TXT= 03, indicating “entered from hospital”), and did not have a nursing home discharge in the 100 days before the admission. This measure can be used as the denominator to calculate the readmission rate for each facility (using NUM_D_REHOSP,	MDS; MBSF; Medicare FFS and MA inpatient, SNF, outpatient, home health, hospice, and carrier files

Variable name	Variable definition	Source data
	described below, for the numerator). This measure includes residents with dementia present in the facility at any time in the measurement year.	
ALZUNIT	**Indicator variable for whether the nursing home has a dementia care unit:** = 1 if the facility has an Alzheimer's disease special care unit = 0 if the facility does not have an Alzheimer's disease special care unit = missing if it is unknown whether the facility has an Alzheimer's disease special care unit	LTCFocus
HOSP_BASED	**Indicator variable for whether the nursing home was in a hospital:** = 1 if Nursing Home Compare indicated that the nursing home was in a hospital (Provider_Resides_in_Hospital = Y) = 0 Nursing Home Compare indicated that the nursing home was not located in a hospital (Provider_Resides_in_Hospital = N)	Nursing Home Compare
MULTIFAC	**Indicator variable for whether the nursing home was part of a chain:** = 1 if Nursing Home Compare indicated that the nursing home was part of a group of nursing homes that shared at least one individual or organizational owner, officer, or entity with operational or managerial control (Affiliated_Entity_ID was not blank) = 0 if Nursing Home Compare indicated that the nursing home was not part of a group of nursing homes that shared at least one individual or organizational owner, officer, or entity with operational or managerial control (Affiliated_Entity_ID was blank)	Nursing Home Compare
ADM_PER_BED	**Number of admissions per bed.** This is calculated as the number of admissions to each nursing home in the measurement year based on the MDS divided by the number of federally certified beds from Nursing Home Compare.	MDS; Nursing Home Compare
OCCPCT	**Occupancy rate on the first Thursday in April of the measurement year.** This is calculated as the number of residents on the first Thursday in April in the measurement year from the MDS divided by the number of federally certified beds from Nursing Home Compare. *Please note that a small number of facilities had occupancy rates greater than 100 percent. Researchers might want to account for out-of-bound values when using this variable.*	MDS; Nursing Home Compare
PAYMCAID	**Percentage of facility residents whose primary support is Medicaid.** This variable contains missing values if the percentage of facility residents whose primary support is Medicaid is unknown.	LTCFocus
RUCA	**Primary rural-urban commuting area (RUCA) code of the nursing home's address:** 1 = Metropolitan area core: primary flow within an urbanized area (UA) 2 = Metropolitan area high commuting: primary flow 30% or more to a UA	Nursing Home Compare; U.S. Department of Agriculture (USDA) 2010 data for RUCA codes[b]

Variable name	Variable definition	Source data
	3 = Metropolitan area low commuting: primary flow 10% to 30% to a UA 4 = Micropolitan area core: primary flow within an urban cluster (UC) of 10,000 to 49,999 (large UC) 5 = Micropolitan high commuting: primary flow 30% or more to a large UC 6 = Micropolitan low commuting: primary flow 10% to 30% to a large UC 7 = Small town core: primary flow within an urban cluster of 2,500 to 9,999 (small UC) 8 = Small town high commuting: primary flow 30% or more to a small UC 9 = Small town low commuting: primary flow 10% to 30% to a small UC 10 = Rural areas: primary flow to a tract outside a UA or UC 99 = Not coded: Census tract has zero population and no rural-urban identifier information	
RURAL	**Indicator variable for whether the nursing home is in a rural region:** = 1 if the nursing home's address is assigned to a RUCA equal to 7–10 = 0 otherwise	Nursing Home Compare; U.S. Department of Agriculture (USDA) 2010 data for RUCA codes[b]
Resident demographics and Medicare enrollment characteristics		
Among residents WITH DEMENTIA in the nursing home on the first Thursday in April of the measurement year		
To calculate the percentage of residents with dementia in the nursing home with any of the characteristics on the first Thursday in April in the section below, please use N_D_RESID as the denominator		
AVG_AGE_D	**Mean age of residents with dementia.** This is the mean age of residents with dementia in the facility on the first Thursday in April of the measurement year, as described above in N_D_RESID, based on the C_RSDNT_AGE_NUM variable from the assessment record on or just before the first Thursday in April.	MDS; Medicare FFS and MA inpatient, SNF, outpatient, home health, hospice, and carrier files
NUM_D_AGE_CAT_LT65	**Number of residents with dementia who were younger than 65.** This is the number of residents with dementia in the facility on the first Thursday in April of the measurement year, as described above in N_D_RESID, in this age category based on the C_RSDNT_AGE_NUM variable from the assessment record on or just before the first Thursday in April.	MDS; Medicare FFS and MA inpatient, SNF, outpatient, home health, hospice, and carrier files
NUM_D_AGE_CAT_65_69	**Number of residents with dementia who were between ages 65 and 69.** This is the number of residents with dementia in the facility on the first Thursday in April of the measurement year, as described above in N_D_RESID, in this age category based on the C_RSDNT_AGE_NUM variable from the assessment record on or just before the first Thursday in April.	MDS; Medicare FFS and MA inpatient, SNF, outpatient, home health, hospice, and carrier files
NUM_D_AGE_CAT_70_74	**Number of residents with dementia who were between ages 70 and 74.** This is the number of residents with dementia in the facility on the first Thursday in April of the measurement year, as described above in N_D_RESID, in this age category based on the C_RSDNT_AGE_NUM variable from the assessment record on or just before the first Thursday in April.	MDS; Medicare FFS and MA inpatient, SNF, outpatient, home health, hospice, and carrier files

Variable name	Variable definition	Source data
NUM_D_AGE_CAT_75_79	**Number of residents with dementia who were between ages 75 and 79.** This is the number of residents with dementia in the facility on the first Thursday in April of the measurement year, as described above in N_D_RESID, in this age category based on the C_RSDNT_AGE_NUM variable from the assessment record on or just before the first Thursday in April.	MDS; Medicare FFS and MA inpatient, SNF, outpatient, home health, hospice, and carrier files
NUM_D_AGE_CAT_80_84	**Number of residents with dementia who were between ages 80 and 84.** This is the number of residents with dementia in the facility on the first Thursday in April of the measurement year, as described above in N_D_RESID, in this age category based on the C_RSDNT_AGE_NUM variable from the assessment record on or just before the first Thursday in April.	MDS; Medicare FFS and MA inpatient, SNF, outpatient, home health, hospice, and carrier files
NUM_D_AGE_CAT_85P	**Number of residents with dementia who were ages 85 and older.** This is the number of residents with dementia in the facility on the first Thursday in April of the measurement year, as described above in N_D_RESID, in this age category based on the C_RSDNT_AGE_NUM variable from the assessment record on or just before the first Thursday in April.	MDS; Medicare FFS and MA inpatient, SNF, outpatient, home health, hospice, and carrier files
NUM_D_FEMALE	**Number of residents with dementia in the nursing home who were female.** This is the number of residents with dementia in the facility on the first Thursday in April of the measurement year, as described above in N_D_RESID, who were female (A0800_GNDR_CD = 2) based on the assessment record on or just before the first Thursday in April.	MDS; Medicare FFS and MA inpatient, SNF, outpatient, home health, hospice, and carrier files
NUM_D_BLACK	**Number of residents with dementia in the nursing home who were Black.** This is the number of residents with dementia in the facility on the first Thursday in April of the measurement year, as described above in N_D_RESID, who were Black (A1000C_AFRCN_AMRCN_CD = 1) based on the assessment record on or just before the first Thursday in April. Note that a resident might be counted in more than one race or ethnicity category.	MDS; Medicare FFS and MA inpatient, SNF, outpatient, home health, hospice, and carrier files
NUM_D_HISPANIC	**Number of residents with dementia in the nursing home who were Hispanic.** This is the number of residents with dementia in the facility on the first Thursday in April of the measurement year, as described above in N_D_RESID, who were Hispanic (A1000D_HSPNC_CD = 1) based on the assessment record on or just before the first Thursday in April. Note that a resident might be counted in more than one race or ethnicity category.	MDS; Medicare FFS and MA inpatient, SNF, outpatient, home health, hospice, and carrier files
NUM_D_WHITE	**Number of residents with dementia in the nursing home who were White.** This is the number of residents with dementia in the facility on the first Thursday in April of the measurement year, as described above in N_D_RESID, who were White (A1000F_WHT_CD = 1) based on the assessment record on or just before the first Thursday in April. Note that a resident might be counted in more than one race or ethnicity category.	MDS; Medicare FFS and MA inpatient, SNF, outpatient, home health, hospice, and carrier files
NUM_D_DUAL	**Number of Medicare residents with dementia in the nursing home who were dually eligible for Medicare or Medicaid (full or partial).** This is the number of residents with dementia in the facility on the first Thursday in April of the measurement year who were	MDS; Medicare FFS and MA inpatient, SNF, outpatient, home

Variable name	Variable definition	Source data
	enrolled in Medicare, as described above in N_D_RESID_MCARE, and who were dually eligible for Medicare and Medicaid in the month (DUAL_STUS_CD_04 = 01, 02, 03, 04, 05, 06, 08 or 10).	health, hospice, and carrier files; MBSF
NUM_D_LIS	**Number of Medicare residents with dementia in the nursing home who were eligible for a Part D low-income drug subsidy.** This is the number of residents with dementia in the facility on the first Thursday in April of the measurement year who were enrolled in Medicare, as described above in N_D_RESID_MCARE, and who were eligible for a low-income drug subsidy in the month (CST_SHR_GRP_CD_04 = 01–08).	MDS; Medicare FFS and MA inpatient, SNF, outpatient, home health, hospice, and carrier files; MBSF
NUM_D_DUALORLIS	**Number of Medicare residents with dementia in the nursing home who were dually eligible for Medicare and Medicaid (full or partial) or who were eligible for a Part D low-income drug subsidy.** This is the number of residents with dementia in the facility on the first Thursday in April of the measurement year who were enrolled in Medicare, as described above in N_D_RESID_MCARE, and who were either dually eligible for Medicare and Medicaid or eligible for a low-income drug subsidy in the month (DUAL_STUS_CD_04 = 01, 02, 03, 04, 05, 06, 08 or 10 or CST_SHR_GRP_CD_04 = 01–08).	MDS; Medicare FFS and MA inpatient, SNF, outpatient, home health, hospice, and carrier files; MBSF
NUM_D_MA_ENRLD	**Number of Medicare residents with dementia in the nursing home who were enrolled in MA.** This is the number of residents with dementia in the facility on the first Thursday in April of the measurement year who were enrolled in Medicare, as described above in N_D_RESID_MCARE, and who were enrolled in a MA plan in the month (HMO_IND_04 = 1, 2, A, B, C).	MDS; Medicare FFS and MA inpatient, SNF, outpatient, home health, hospice, and carrier files; MBSF
NUM_D_PARTD	**Number of Medicare residents with dementia in the nursing home who were enrolled in Part D.** This is the number of residents with dementia in the facility on the first Thursday in April of the measurement year who were enrolled in Medicare, as described above in N_D_RESID_MCARE, and who had Part D coverage in the month (the first value of PTD_CNTRCT_ID_04 = {H, R, S, E} or the first value of PTD_CNTRCT_ID_04 = X and is followed by four alphanumeric characters).	MDS; Medicare FFS and MA inpatient, SNF, outpatient, home health, hospice, and carrier files; MBSF
Among ALL RESIDENTS (with and without dementia) in the nursing home on the first Thursday in April of the measurement year		
To calculate the percentage of residents in the nursing home with any of the characteristics on the first Thursday in April in the section below, please use N_RESID_ALL as the denominator		
AVG_AGE_ALL	**Mean age of all residents in the nursing home.** This is the mean age of all residents in the facility on the first Thursday in April of the measurement year, as described above in NRESID_ALL, based on the C_RSDNT_AGE_NUM variable from the assessment record on or just before the first Thursday in April.	MDS
NUM_ALL_AGE_CAT_LT65	**Number of residents who were younger than 65.** This is the number of residents in the facility on the first Thursday in April of the measurement year, as described above in	MDS

Variable name	Variable definition	Source data
	NRESID_ALL, in this age category based on the C_RSDNT_AGE_NUM variable from the assessment record on or just before the first Thursday in April.	
NUM_ALL_AGE_CAT_65_69	**Number of residents who were between ages 65 and 69.** This is the number of residents in the facility on the first Thursday in April of the measurement year, as described above in NRESID_ALL, in this age category based on the C_RSDNT_AGE_NUM variable from the assessment record on or just before the first Thursday in April.	MDS
NUM_ALL_AGE_CAT_70_74	**Number of residents who were between ages 70 and 74.** This is the number of residents in the facility on the first Thursday in April of the measurement year, as described above in NRESID_ALL, in this age category based on the C_RSDNT_AGE_NUM variable from the assessment record on or just before the first Thursday in April.	MDS
NUM_ALL_AGE_CAT_75_79	**Number of residents who were between ages 75 and 79.** This is the number of residents in the facility on the first Thursday in April of the measurement year, as described above in NRESID_ALL, in this age category based on the C_RSDNT_AGE_NUM variable from the assessment record on or just before the first Thursday in April.	MDS
NUM_ALL_AGE_CAT_80_84	**Number of residents who were between ages 80 and 84.** This is the number of residents in the facility on the first Thursday in April of the measurement year, as described above in NRESID_ALL, in this age category based on the C_RSDNT_AGE_NUM variable from the assessment record on or just before the first Thursday in April.	MDS
NUM_ALL_AGE_CAT_85P	**Number of residents who were ages 85 and older.** This is the number of residents in the facility on the first Thursday in April of the measurement year, as described above in NRESID_ALL, in this age category based on the C_RSDNT_AGE_NUM variable from the assessment record on or just before the first Thursday in April.	MDS
NUM_ALL_FEMALE	**Number of residents in the nursing home who were female.** This is the number of residents in the facility on the first Thursday in April of the measurement year, as described above in NRESID_ALL, who were female (A0800_GNDR_CD = 2) based on the assessment record on or just before the first Thursday in April.	MDS
NUM_ALL_BLACK	**Number of residents in the nursing home who were Black.** This is the number of residents in the facility on the first Thursday in April of the measurement year, as described above in NRESID_ALL, who were Black (A1000C_AFRCN_AMRCN_CD = 1) based on the assessment record on or just before the first Thursday in April. Note that a resident might be counted in more than one race or ethnicity category.	MDS
NUM_ALL_HISPANIC	**Number of residents in the nursing home who were Hispanic.** This is the number of residents in the facility on the first Thursday in April of the measurement year, as described above in NRESID_ALL, who were Hispanic (A1000D_HSPNC_CD = 1) based on the	MDS

Variable name	Variable definition	Source data
	assessment record on or just before the first Thursday in April. Note that a resident might be counted in more than one race or ethnicity category.	
NUM_ALL_WHITE	**Number of residents in the nursing home who were White.** This is the number of residents in the facility on the first Thursday in April of the measurement year, as described above in NRESID_ALL, who were White (A1000F_WHT_CD = 1) based on the assessment record on or just before the first Thursday in April. Note that a resident might be counted in more than one race or ethnicity category.	MDS
NUM_ALL_DUAL	**Number of Medicare residents in the nursing home who were dually eligible for Medicare or Medicaid (full or partial).** This is the number of residents in the facility on the first Thursday in April of the measurement year who were enrolled in Medicare, as described above in NRESID_MCARE, and who were dually eligible for Medicare and Medicaid in the month (DUAL_STUS_CD_04 = 01, 02, 03, 04, 05, 06, 08 or 10).	MDS; MBSF
NUM_ALL_LIS	**Number of Medicare residents in the nursing home who were eligible for a Part D low-income drug subsidy.** This is the number of residents in the facility on the first Thursday in April of the measurement year who were enrolled in Medicare, as described above in NRESID_MCARE, and who were eligible for a low-income drug subsidy in the month (CST_SHR_GRP_CD_04 = 01–08)	MDS; MBSF
NUM_ALL_DUALORLIS	**Number of Medicare residents in the nursing home who were dually eligible for Medicare and Medicaid (full or partial) or who were eligible for a Part D low-income drug subsidy.** This is the number of residents in the facility on the first Thursday in April of the measurement year who were enrolled in Medicare, as described above in NRESID_MCARE, and who were either dually eligible for Medicare and Medicaid or eligible for a low-income drug subsidy in the month (DUAL_STUS_CD_04 = 01, 02, 03, 04, 05, 06, 08 or 10 or CST_SHR_GRP_CD_04 = 01–08).	MDS; MBSF
NUM_ALL_MA_ENRLD	**Number of Medicare residents in the nursing home who were enrolled in MA.** This is the number of residents in the facility on the first Thursday in April of the measurement year who were enrolled in Medicare, as described above in NRESID_MCARE, and who were enrolled in a MA plan in the month (HMO_IND_04 = 1, 2, A, B, C).	MDS; MBSF
NUM_ALL_PARTD	**Number of Medicare residents in the nursing home who were enrolled in Part D.** This is the number of residents in the facility on the first Thursday in April of the measurement year who were enrolled in Medicare, as described above in NRESID_MCARE, and who had Part D coverage in the month (the first value of PTD_CNTRCT_ID_04 = {H, R, S, E} or the first value of PTD_CNTRCT_ID_04 = X and is followed by four alphanumeric characters).	MDS; MBSF
Clinical characteristics of residents with dementia in the facility on the first Thursday in April of the measurement year[c]		

Variable name	Variable definition	Source data
To calculate the percentage of residents with dementia in the nursing home with any of the clinical characteristics on the first Thursday in April in the section below, please use N_D_RESID as the denominator. The one exception to this is for calculating the mean HCC score for a facility using HCC_D_MEAN, as HCC_D_MEAN is only calculated among residents with dementia enrolled in Medicare. To calculate the mean HCC score among residents with dementia enrolled in Medicare in the nursing home, please use N_D_RESID_MCARE as the denominator		
NUM_D_HIGH_CFS	**Number of residents with dementia with a cognitive function score (CFS) of 4 (severe cognitive impairment).** This is the number of residents with dementia who did not complete the Brief Interview for Mental Status (BIMS) and had a cognitive performance score (CPS) score equal to 5 or 6—meaning that they were either in a coma or they had severe functional impairment and were dependent on assistance for eating—based on the assessment record on or just before the first Thursday in April of the measurement year. We calculated the CFS using the algorithm developed by Thomas et al. (2017),[d] which uses the BIMS, if completed, otherwise the CPS (Morris et al. 1994).[e]	MDS
NUM_D_MID_CFS	**Number of residents with dementia with a CFS of 2 or 3 (moderate or mild cognitive impairment).** This the number of residents with dementia who had a CFS score indicating they were moderately impaired (that is, they scored between 0 and 7 on the BIMS or had a CPS score equal to 3 or 4) or mildly impaired (that is, they scored between 8 and 12 on the BIMS or had a CPS score between 0 and 2) based on the assessment record on or just before the first Thursday in April of the measurement year. We calculated the CFS using the algorithm developed by Thomas et al. (2017),[d] which uses the BIMS, if completed, otherwise the CPS (Morris et al. 1994).[e]	MDS
NUM_D_BEDFAST	**Number of residents with dementia who were bedfast.** This is the number of residents with dementia who were dependent on staff for assistance transferring between surfaces or where no transfer occurred in the past seven days (G0110B1_TRNSFR_SELF_CD = 4 or 8) based on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_CATH	**Number of residents with dementia who had a catheter.** This is the number of residents with dementia with an indwelling catheter in the past seven days (H0100A_INDWLG_CTHTR_CD = 1) based on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_FALL	**Number of residents with dementia who had fallen since admission or prior assessment.** This is the number of residents with dementia with a fall since admission or since the prior assessment (J1800_FALL_LAST_ASMT_CD = 1) based on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_INCNT_BLDR	**Number of residents with dementia who were bladder incontinent.** This is the number of residents with dementia who were “occasionally,” “frequently,” or “always” bladder incontinent in	MDS

Variable name	Variable definition	Source data
	the past seven days (H0300_URNRY_CNTNC_CD = 1, 2, or 3) based on the assessment record on or just before the first Thursday in April of the measurement year.	
NUM_D_INCNT_BWL	**Number of residents with dementia who were bowel incontinent.** This is the number of residents with dementia who were "occasionally," "frequently," or "always" bowel incontinent in the past seven days (H0400_BWL_CNTNC_CD = 1, 2, or 3) based on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_LOWCARE	**Number of residents with dementia who were low care.** This is the number of residents with dementia who did not require physical assistance in any of the four late-loss activities of daily living—bed mobility, transferring, using the toilet, and eating (G0110A2_BED_MBLTY_SPRT_CD = 0 and G0110B2_TRNSFR_SPRT_CD = 0 and G0110H2_EATG_SPRT_CD = 0 and G0110I2_TOILTG_SPRT_CD = 0) based on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_PAIN_TOT	**Number of residents with dementia who had pain (either self- or staff-reported).** This is the number of residents with dementia who self-reported pain (J0300_PAIN_CD = 1) or for whom staff reported they had pain in the past seven days (J0800A_NVRBL_SND_CD = 1 or J0800B_VCL_CMPLNT_CD = 1 or J0800C_FACE_EXPRSN_CD = 1 or J0800D_PRTCTV_MVMT_CD = 1) based on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
HCC_D_MEAN	**Mean hierarchical condition category (HCC) score among residents with dementia enrolled in Medicare.** This is the mean HCC score among residents with dementia enrolled in Medicare who were in the facility on the first Thursday in April of the measurement year. We calculated HCC scores using CMS's publicly available 2024 HCC software (version 28), available at: https://www.cms.gov/medicare/payment/medicare-advantage-rates-statistics/risk-adjustment (last accessed June 5, 2025). We ran the software on FFS and MA claims of the year prior to the measurement year (12-month lookback). The HCC algorithm calculates scores for beneficiaries in institutional settings (institutional score), beneficiaries with less than 12 months of Part B coverage in the measurement year (new enrollee score), and for beneficiaries otherwise in the community (community score). (There is a separate HCC algorithm for beneficiaries with end stage renal disease [ESRD], but we did not use the ESRD model, as it requires information on kidney transplants that were unavailable to us). We assigned all residents the institutional HCC score because they were all in a nursing home on the first Thursday in April of the measurement year. Following CMS's approach, we normalized the HCC scores and applied a managed care coding intensity factor to account for differences in diagnosis code submission patterns between FFS and MA (the coding factor adjusts HCC scores of residents enrolled in MA plans downwards).	MDS; MBSF; Medicare FFS and MA inpatient, outpatient, and carrier files; MBSF; publicly available 2024 HCC software

Variable name	Variable definition	Source data
MORT_RISK_SCR_D_MEAN	**Mean mortality risk score.** This is the mean mortality risk score (MRS), calculated based on the algorithm developed by Thomas et al. (2019)[f] among residents with dementia in the facility on the first Thursday in April of the measurement year. The MRS is a continuous score ranging from 1 to 20, with higher scores indicating greater mortality risk. We calculated the MRS using the assessment record on or just before the first Thursday in April.	MDS
NUM_D_CANCER	**Number of residents with dementia with a diagnosis of cancer.** This is the number of residents with dementia with I0100_CNCR_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_ANEMIA	**Number of residents with dementia with a diagnosis of anemia.** This is the number of residents with dementia with I0200_ANEMIA_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_CAD	**Number of residents with dementia with a diagnosis of coronary artery disease.** This is the number of residents with dementia with I0400_CAD_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_HRT_FAILR	**Number of residents with dementia with a diagnosis of heart failure.** This is the number of residents with dementia with I0600_HRT_FAILR_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_HYPERT	**Number of residents with dementia with a diagnosis of hypertension.** This is the number of residents with dementia with I0700_HYPRTNSN_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_HYPOTNSN	**Number of residents with dementia with a diagnosis of hypotension.** This is the number of residents with dementia with I0800_HYPOTNSN_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_PVD	**Number of residents with dementia with a diagnosis of peripheral vascular disease.** This is the number of residents with dementia with I0900_PVD_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_ULCRTV_CLTS	**Number of residents with dementia with a diagnosis of ulcerative colitis.** This is the number of residents with dementia with I1300_ULCRTV_CLTS_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_ESRD	**Number of residents with dementia with a diagnosis of end stage renal disease.** This is the number of residents with dementia with I1500_ESRD_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS

Variable name	Variable definition	Source data
NUM_D_NRGNC_BLADR	**Number of residents with dementia with a diagnosis of neurogenic bladder.** This is the number of residents with dementia with I1550_NRGNC_BLADR_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_OBSTRCT_URPTHY	**Number of residents with dementia with a diagnosis of obstructive uropathy.** This is the number of residents with dementia with I1650_OBSTRCT_URPTHY_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_MDRO	**Number of residents with dementia with a diagnosis of multidrug-resistant organism.** This is the number of residents with dementia with I1700_MDRO_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_PNEU	**Number of residents with dementia with a diagnosis of pneumonia.** This is the number of residents with dementia with I2000_PNEUMO_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_SPTCMIA	**Number of residents with dementia with a diagnosis of septicemia.** This is the number of residents with dementia with I2100_SPTCMIA_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_TB	**Number of residents with dementia with a diagnosis of tuberculosis.** This is the number of residents with dementia with I2200_TB_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_UTI	**Number of residents with dementia with a diagnosis of urinary tract infection.** This is the number of residents with dementia with I2300_UTI_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_VRL_HPT	**Number of residents with dementia with a diagnosis of viral hepatitis.** This is the number of residents with dementia with I2400_VRL_HPT_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_WND_INFCTN	**Number of residents with dementia with a diagnosis of wound infection.** This is the number of residents with dementia with I2500_WND_INFCTN_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_DM	**Number of residents with dementia with a diagnosis of diabetes.** This is the number of residents with dementia with I2900_DM_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_HYPONATREMIA	**Number of residents with dementia with a diagnosis of hyponatremia.** This is the number of residents with dementia with I3100_HYPONATREMIA_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS

Variable name	Variable definition	Source data
NUM_D_HYPERKALEMIA	**Number of residents with dementia with a diagnosis of hyperkalemia.** This is the number of residents with dementia with I3200_HYPERKALEMIA_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_HYPERLPD	**Number of residents with dementia with a diagnosis of hyperlipidemia.** This is the number of residents with dementia with I3300_HYPERLIPIDMIA_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_HIP_FRCTR	**Number of residents with dementia with a diagnosis of hip fracture.** This is the number of residents with dementia with I3900_HIP_FRCTR_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_OTHR_FRCTR	**Number of residents with dementia with a diagnosis of other fractures.** This is the number of residents with dementia with I4000_OTHR_FRCTR_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_ALZHMR	**Number of residents with dementia with a diagnosis of Alzheimer's disease.** This is the number of residents with dementia with I4200_ALZHMR_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_APHASIA	**Number of residents with dementia with a diagnosis of aphasia.** This is the number of residents with dementia with I4300_APHASIA_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_CRBRL_PLSY	**Number of residents with dementia with a diagnosis of cerebral palsy.** This is the number of residents with dementia with I4400_CRBRL_PLSY_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_STRK	**Number of residents with dementia with a diagnosis of stroke.** This is the number of residents with dementia with I4500_STRK_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_DMNT	**Number of residents with dementia with a diagnosis of non-Alzheimer's dementia.** This is the number of residents with dementia with I4800_DMNT_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_HEMIPLG	**Number of residents with dementia with a diagnosis of hemiplegia.** This is the number of residents with dementia with I4900_HEMIPLG_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_PARAPLG	**Number of residents with dementia with a diagnosis of paraplegia.** This is the number of residents with dementia with I5000_PARAPLG_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS

Variable name	Variable definition	Source data
NUM_D_QUADPLG	**Number of residents with dementia with a diagnosis of quadriplegia.** This is the number of residents with dementia with I5100_QUADPLG_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_MS	**Number of residents with dementia with a diagnosis of multiple sclerosis.** This is the number of residents with dementia with I5200_MS_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_HNTGTN	**Number of residents with dementia with a diagnosis of Huntington's disease.** This is the number of residents with dementia with I5250_HNTGTN_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_PRKNSN	**Number of residents with dementia with a diagnosis of Parkinson's disease.** This is the number of residents with dementia with I5300_PRKNSN_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_TOURT	**Number of residents with dementia with a diagnosis of Tourette's syndrome.** This is the number of residents with dementia with I5350_TOURT_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_SZRE	**Number of residents with dementia with a diagnosis of seizure disorder or epilepsy.** This is the number of residents with dementia with I5400_SZRE_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_TBI	**Number of residents with dementia with a diagnosis of traumatic brain injury.** This is the number of residents with dementia with I5500_BRN_INJURY_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_MALNTRTN	**Number of residents with dementia with a diagnosis of malnutrition.** This is the number of residents with dementia with I5600_MALNTRTN_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_ANXTY	**Number of residents with dementia with a diagnosis of anxiety disorder.** This is the number of residents with dementia with I5700_ANXTY_DSORDR_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_DPRSN	**Number of residents with dementia with a diagnosis of depression (other than bipolar).** This is the number of residents with dementia with I5800_DPRSN_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_MNC_DPRSN	**Number of residents with dementia with a diagnosis of manic depression (bipolar disorder).** This is the number of residents with dementia with I5900_MNC_DPRSN_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS

Variable name	Variable definition	Source data
NUM_D_PSYCHTC	**Number of residents with dementia with a diagnosis of psychotic disorder.** This is the number of residents with dementia with I5950_PSYCHTC_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_SCHZ	**Number of residents with dementia with a diagnosis of schizophrenia (schizoaffective and schizophreniform disorders).** This is the number of residents with dementia with I6000_SCHZOPRNIA_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_PTSD	**Number of residents with dementia with a diagnosis of post-traumatic stress disorder.** This is the number of residents with dementia with I6100_PTSD_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_ASTHMA	**Number of residents with dementia with a diagnosis of asthma.** This is the number of residents with dementia with I6200_ASTHMA_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
NUM_D_RSPRTRY_FAILR	**Number of residents with dementia with a diagnosis of respiratory failure.** This is the number of residents with dementia with I6300_RSPRTRY_FAILR_CD = 1 on the assessment record on or just before the first Thursday in April of the measurement year.	MDS
Service use among residents with dementia		
MDS-based service use among residents with dementia[c]		
NUM_D_REHOSP	**The number of facility admissions from acute care hospitals that resulted in a readmission to a hospital.** This is calculated as the number of admissions to the facility from an acute hospital among residents with dementia ages 55 and older who were admitted from an acute care hospital and did not have a nursing home discharge in the 100 days before admission, as described above in N_D_ADMSN_FROM_HOSP, that ended in a discharge to an acute care hospital (A2100_DSCHRG_STUS_CD = 03, indicating “discharge to acute hospital”) within 30 days of admission. This measure can be used as the numerator to calculate the readmission rate for each facility (using N_D_ADMSN_FROM_HOSP, described above, for the denominator). This measure includes residents with dementia present in the facility at any time in the measurement year. To calculate the readmission rate for each facility, *please use N_D_ADMSN_FROM_HOSP for the denominator*	MDS
Parts A- and B-based service use among residents with dementia enrolled in Medicare[c]		
TOT_D_ACUTE_IP_DAYS	**Number of acute inpatient days from the nursing home per resident year.** This is calculated as the number of days in an acute inpatient setting among Medicare-enrolled	MDS; Medicare FFS and MA inpatient files

Variable name	Variable definition	Source data
	residents with dementia divided by the number of resident years in the facility among dementia residents (N_D_MCARE_RESYRS). Specifically, we identified inpatient stays at acute care facilities in Medicare FFS claims and MA encounter records that occurred on the discharge date of a nursing home stay (that is, the nursing home stay led to an acute inpatient stay) or overlapped with a nursing home stay and then summed the total number of acute inpatient days across all residents with dementia before dividing by number of resident years among dementia residents. The definition of acute inpatient stays excludes FFS claims and MA encounter records for inpatient psychiatric stays, inpatient rehabilitation stays, and long-term hospital stays. This measure includes any day(s) in an ED or observation unit for acute inpatient admissions that began in the ED. Multiple claims representing transfers between hospitals for the same resident were combined into a single stay, as were multiple claims at the same hospital with overlapping dates for the same resident, so these count as one admission and overlapping inpatient days are only counted once. This measure includes residents with dementia present in the facility at any time in the measurement year.	
TOT_D_ED_VISITS	**Number of outpatient ED visits (including observation stays) from the nursing home per resident year.** This is calculated as the number of outpatient ED visits and observation stays among Medicare-enrolled residents with dementia divided by the number of resident years in the facility among dementia residents (N_D_MCARE_RESYRS). Specifically, we flagged outpatient FFS claims and MA encounter records as outpatient ED visits if any revenue center line contained 045X (where "X" is a wildcard that can take any value) or 0981 (emergency room care). If there were any claims flagged as ED visits, but all revenue center lines for the claim were for imaging and tests—that is, if every revenue center line on the claim had a procedure code in the 70000–79999 or 80000–89999 range, we excluded the claim from the count of outpatient ED visits (our assumption was that the visit was for pre-admission testing). We flagged outpatient claims as observation visits if any revenue center code contained 0762 (treatment or observation room), or 0760 (treatment or observation room—general classification) and if the number of service units was more than eight hours and the claim line had a corresponding HCPCS code of G0378 (hospital observation services per hour). A single outpatient claim might be flagged as both an ED visit and an observation stay. In this case, we only counted it as one visit. We counted only one ED visit or observation stay per beneficiary per day (with the assumption that multiple claims on the same day were part of the same episode). We then identified ED visits and observation stays that overlapped with a nursing home stay. This measure excludes ED visits or observation stays on inpatient claims—that is, where an ED visit led to an inpatient admission at the same hospital. This measure includes residents with dementia present in the facility at any time in the measurement year.	MDS; Medicare FFS and MA outpatient files
TOT_D_PAH_IP_DAYS	**Number of acute inpatient days from the nursing home that were potentially avoidable per resident year.** This is calculated as the number of days in an acute inpatient setting for	MDS; Medicare FFS and MA inpatient files

Variable name	Variable definition	Source data
	stays that were potentially avoidable among Medicare-enrolled residents with dementia divided by the number of resident years in the facility among dementia residents (N_D_MCARE_RESYRS). Specifically, we identified inpatient stays at acute care facilities in Medicare FFS claims and MA encounter records that occurred on the discharge date of a nursing home stay (that is, the nursing home stay led to an acute inpatient stay) or overlapped with a nursing home stay and that were potentially avoidable. Potentially avoidable inpatient stays had a principal diagnosis code for a condition considered potentially preventable or manageable in nursing homes (Ouslander et al. 2010; Walsh et al. 2012; Hamasaki et al. 2023).[g] See above for additional details on how we processed inpatient claims and Appendix Table 2 for a list of potentially avoidable conditions and corresponding diagnosis codes.	
TOT_D_PAH_ED_VISITS	**Number of outpatient ED visits (including observation stays) from the nursing home that were potentially avoidable per resident year.** This is calculated as the number of outpatient ED visits and observation stays that were potentially avoidable among Medicare-enrolled residents with dementia divided by the number of resident years in the facility among dementia residents (N_D_MCARE_RESYRS). Specifically, we identified outpatient ED visits and observation stays in Medicare FFS claims and MA encounter records that overlapped with a nursing home stay and that were potentially avoidable. Potentially avoidable ED visits and observation stays had a principal diagnosis code for a condition considered potentially preventable or manageable in nursing homes (Ouslander et al. 2010; Walsh et al. 2012; Hamasaki et al. 2023).[g] See above for additional details on how we processed outpatient ED and observation stay claims and Appendix Table 2 for a list of potentially avoidable conditions and corresponding diagnosis codes.	MDS; Medicare FFS and MA outpatient files
Part D-based drug use among residents with dementia enrolled in Part D[c]		
TOTCLMS_D_OPIODS	**Among residents with dementia in the facility, the total number of claims for opioids.** This is the total number of drug claims (also called fills or events) for opioids for Medicare-enrolled, Part D-covered beneficiaries with dementia during all nursing home stays in the measurement year, excluding the first and last day of each nursing home stay (in case the fill was made in the community or other setting). To identify claims for opioids, we first compiled a list of generic opioid drug names from CMS's 2023 Medicare Part D Specific Drug Lists Report, available at: https://data.cms.gov/provider-summary-by-type-of-service/medicare-part-d-prescribers/medicare-part-d-prescribers-by-provider (last accessed June 6, 2025). We then searched the Part D drug characteristics file for all 11-digit National Drug Codes (NDCs) associated with those drug names, searching in both brand and generic name fields. From this initial list of NDC codes, we created a list of unique nine-digit NDCs by dropping the last two digits from each NDC code (the last two digits describe the drug packaging). We then flagged all Part D Event (PDE) claims for residents with dementia that matched the list of NDC codes	MDS; PDE claims; Part D drug characteristics file; Medicare Part D Specific Drug Lists Report;

Variable name	Variable definition	Source data
	for opioids on the first nine digits and where the fill date overlapped with a nursing home stay. See Appendix Table 3 for a list of generic drug names for opioids. *To calculate the number of opioid claims per resident year, please use N_D_MCARE_PTD_RESYRS as the denominator*	
TOTDAYS_D_OPIOIDS	**Among residents with dementia in the facility, total number of days' supply for opioids.** This is the total number of days' supply across all Part D claims for opioids for Medicare-enrolled, Part D-covered beneficiaries with dementia during all nursing home stays in the measurement year. See above for details on how we identified Part D claims for opioids and Appendix Table 3 for a list of generic drug names for opioids.	MDS; PDE claims; Part D drug characteristics file; Medicare Part D Specific Drug Lists Report
TOTCLMS_D_ANTIBIOTICS	**Among residents with dementia in the facility, total number of claims for antibiotics.** This is the total number of drug fills for antibiotics for Medicare-enrolled, Part D-covered beneficiaries with dementia during all nursing home stays in the measurement year, excluding the first and last day of each nursing home stay (in case the fill was made in the community or other setting). To identify claims for antibiotics, we first compiled a list of generic antibiotic drug names from CMS's 2023 Medicare Part D Specific Drug Lists Report, available at: https://data.cms.gov/provider-summary-by-type-of-service/medicare-part-d-prescribers/medicare-part-d-prescribers-by-provider (last accessed June 6, 2025). We then searched the drug characteristics file for all 11-digit NDCs associated with those drug names, searching in both brand and generic name fields. From this initial list of NDC codes, we created a list of unique nine-digit NDCs by dropping the last two digits from each NDC code (the last two digits describe the drug packaging). We then flagged all PDE claims for residents with dementia that matched the list of NDC codes for antibiotics on the first nine digits and where the fill date overlapped with a nursing home stay. See Appendix Table 3 for a list of generic drug names for antibiotics. *To calculate the number of antibiotic claims per resident year, please use N_D_MCARE_PTD_RESYRS as the denominator*	MDS; PDE claims; Part D drug characteristics file; Medicare Part D Specific Drug Lists Report
TOTDAYS_D_ANTIBIOTICS	**Among residents with dementia in the facility, total number of days' supply for antibiotics.** This is the total number of days' supply across all Part D claims for antibiotics for Medicare-enrolled, Part D-covered beneficiaries with dementia during all nursing home stays in the measurement year. See above for details on how we identified Part D claims for antibiotics and Appendix Table 3 for a list of generic drug names for antibiotics.	MDS; PDE claims; Part D drug characteristics file; Medicare Part D Specific Drug Lists Report

Variable name	Variable definition	Source data
TOTCLMS_D_ANTIPSYCH	**Among residents with dementia in the facility, total number of claims for antipsychotics.** This is the total number of drug fills for antipsychotics for Medicare-enrolled, Part D-covered beneficiaries with dementia during all nursing home stays in the measurement year, excluding the first and last day of each nursing home stay (in case the fill was made in the community or other setting). To identify claims for antipsychotics, we first compiled a list of generic antipsychotic drug names from CMS's 2023 Medicare Part D Specific Drug Lists Report, available at: https://data.cms.gov/provider-summary-by-type-of-service/medicare-part-d-prescribers/medicare-part-d-prescribers-by-provider (last accessed June 6, 2025). We then searched the drug characteristics file for all 11-digit NDCs associated with those drug names, searching in both brand and generic name fields. From this initial list of NDC codes, we created a list of unique nine-digit NDCs by dropping the last two digits from each NDC code (the last two digits describe the drug packaging). We then flagged all PDE claims for residents with dementia that matched the list of NDC codes for antipsychotics on the first nine digits and where the fill date overlapped with a nursing home stay. See Appendix Table 3 for a list of generic drug names for antipsychotics. *To calculate the number of antipsychotic claims per resident year, please use N_D_MCARE_PTD_RESYRS as the denominator*	MDS; PDE claims; Part D drug characteristics file; Medicare Part D Specific Drug Lists Report
TOTDAYS_D_ANTIPSYCH	**Among residents with dementia in the facility, total number of days' supply for antipsychotics.** This is the total number of days' supply across all Part D claims for antipsychotics for Medicare-enrolled, Part D-covered beneficiaries with dementia during all nursing home stays in the measurement year. See above for details on how we identified Part D claims for antipsychotics and Appendix Table 3 for a list of generic drug names for antipsychotics.	MDS; PDE claims; Part D drug characteristics file; Medicare Part D Specific Drug Lists Report
TOTCLMS_D_ANTIDEPR	**Among residents with dementia in the facility, total number of claims for antidepressants.** This is the total number of drug fills for antidepressants for Medicare-enrolled, Part D-covered beneficiaries with dementia during all nursing home stays in the measurement year, excluding the first and last day of each nursing home stay (in case the fill was made in the community or other setting). To identify claims for antidepressants, we first compiled a list of generic antidepressant drug names from the American Hospital Formulary System (AHFS) Pharmacologic-Therapeutic Classification. The full 2019 AHFS list is publicly available at: https://www.oregon.gov/obnm/Documents/Formulary%20Information/AHFSClassificationwithDrugs2019.pdf (last accessed June 6, 2025). We then searched the drug characteristics file for all 11-digit NDCs associated with those drug names, searching in both brand and generic name fields. From this initial list of NDC codes, we created a list of unique nine-digit NDCs by	MDS; PDE claims; Part D drug characteristics file; AHFS 2019 Pharmacologic-Therapeutic Classification

Variable name	Variable definition	Source data
	dropping the last two digits from each NDC code (the last two digits describe the drug packaging). We then flagged all PDE claims for residents with dementia that matched the list of NDC codes for antidepressants on the first nine digits and where the fill date overlapped with a nursing home stay. See Appendix Table 3 for a list of generic drug names for antidepressants. *To calculate the number of antidepressant claims per resident year, please use N_D_MCARE_PTD_RESYRS as the denominator*	
TOTDAYS_D_ANTIDEPR	**Among residents with dementia in the facility, total number of days' supply for antidepressants.** This is the total number of days' supply across all Part D claims for antidepressants for Medicare-enrolled, Part D-covered beneficiaries with dementia during all nursing home stays in the measurement year. See above for details on how we identified Part D claims for antidepressants and Appendix Table 3 for a list of generic drug names for antidepressants	MDS; PDE claims; Part D drug characteristics file; AHFS 2019 Pharmacologic-Therapeutic Classification
TOTCLMS_D_BENZOS	**Among residents with dementia in the facility, total number of claims for benzodiazepines or Z-drugs.** This is the total number of drug fills for benzodiazepines or Z-drugs for Medicare-enrolled, Part D-covered beneficiaries with dementia during all nursing home stays in the measurement year, excluding the first and last day of each nursing home stay (in case the fill was made in the community or other setting). To identify claims for benzodiazepines or Z-drugs, we first compiled a list of generic benzodiazepine or Z-drug names from the AHFS Pharmacologic-Therapeutic Classification. The full 2019 AHFS list is publicly available at: https://www.oregon.gov/obnm/Documents/Formulary%20Information/AHFSClassificationwithDrugs2019.pdf (last accessed June 6, 2025). We then searched the drug characteristics file for all 11-digit NDCs associated with those drug names, searching in both brand and generic name fields. From this initial list of NDC codes, we created a list of unique nine-digit NDCs by dropping the last two digits from each NDC code (the last two digits describe the drug packaging). We then flagged all PDE claims for residents with dementia that matched the list of NDC codes for benzodiazepines or Z-drugs on the first nine digits and where the fill date overlapped with a nursing home stay. See Appendix Table 3 for a list of generic drug names for benzodiazepines or Z-drugs. *To calculate the number of benzodiazepine or Z-drug claims per resident year, please use N_D_MCARE_PTD_RESYRS as the denominator*	MDS; PDE claims; Part D drug characteristics file; AHFS 2019 Pharmacologic-Therapeutic Classification
TOTDAYS_D_BENZOS	**Among residents with dementia in the facility, total number of days' supply for benzodiazepines or Z-drugs.** This is the total number of days' supply across all Part D claims for benzodiazepines or Z-drugs for Medicare-enrolled, Part D-covered beneficiaries with	MDS; PDE claims; Part D drug characteristics file; AHFS 2019

Variable name	Variable definition	Source data
	dementia during all nursing home stays in the measurement year. See above for details on how we identified Part D claims for benzodiazepines or Z-drugs and Appendix Table 3 for a list of generic drug names for benzodiazepines or Z-drugs.	Pharmacologic-Therapeutic Classification
TOTCLMS_D_ANTISEIZURE	**Among residents with dementia in the facility, total number of claims for antiseizure medications.** This is the total number of drug fills for antiseizure medications for Medicare-enrolled, Part D-covered beneficiaries with dementia during all nursing home stays in the measurement year, excluding the first and last day of each nursing home stay (in case the fill was made in the community or other setting). To identify claims for antiseizure medications, we first compiled a list of generic antiseizure drug names from the AHFS Pharmacologic-Therapeutic Classification. The full 2019 AHFS list is publicly available at: https://www.oregon.gov/obnm/Documents/Formulary%20Information/AHFSClassificationwithDrugs2019.pdf (last accessed June 6, 2025). We then searched the drug characteristics file for all 11-digit NDCs associated with those drug names, searching in both brand and generic name fields. From this initial list of NDC codes, we created a list of unique nine-digit NDCs by dropping the last two digits from each NDC code (the last two digits describe the drug packaging). We then flagged all PDE claims for residents with dementia that matched the list of NDC codes for antiseizure medications on the first nine digits and where the fill date overlapped with a nursing home stay. See Appendix Table 3 for a list of generic drug names for antiseizure medications. *To calculate the number of antiseizure medication claims per resident year, please use N_D_MCARE_PTD_RESYRS as the denominator*	MDS; PDE claims; Part D drug characteristics file; AHFS 2019 Pharmacologic-Therapeutic Classification
TOTDAYS_D_ANTISEIZURE	**Among residents with dementia in the facility, total number of days' supply for antiseizure medications.** This is the total number of days' supply across all Part D claims for antiseizure medications for Medicare-enrolled, Part D-covered beneficiaries with dementia during all nursing home stays in the measurement year. See above for details on how we identified Part D claims for antiseizure medications and Appendix Table 3 for a list of generic drug names for antiseizure medications.	MDS; PDE claims; Part D drug characteristics file; AHFS 2019 Pharmacologic-Therapeutic Classification
TOTCLMS_D_CHLN_INHBTR_MEM	**Among residents with dementia in the facility, total number of claims for cholinesterase inhibitors or memantine.** This is the total number of drug fills for cholinesterase inhibitors or memantine for Medicare-enrolled, Part D-covered beneficiaries with dementia during all nursing home stays in the measurement year, excluding the first and last day of each nursing home stay (in case the fill was made in the community or another setting). To identify claims for cholinesterase inhibitors or memantine, we first compiled a list of generic drug names for cholinesterase inhibitors or memantine. We then searched the drug characteristics file for all 11-digit NDCs associated with those drug names, searching in both brand and generic name	MDS; PDE claims; Part D drug characteristics file

Variable name	Variable definition	Source data
	fields. From this initial list of NDC codes, we created a list of unique nine-digit NDCs by dropping the last two digits from each NDC code (the last two digits describe the drug packaging). We then flagged all PDE claims for residents with dementia that matched the list of NDC codes for cholinesterase inhibitors or memantine on the first nine digits and where the fill date overlapped with a nursing home stay. See Appendix Table 3 for a list of generic drug names for cholinesterase inhibitors or memantine. *To calculate the number of cholinesterase or memantine claims per resident year, please use N_D_MCARE_PTD_RESYRS as the denominator*	
TOTDAYS_D_CHLN_INHBTR_MEM	**Among residents with dementia in the facility, total number of days' supply for cholinesterase inhibitors or memantine.** This is the total number of days' supply across all Part D claims for cholinesterase inhibitors or memantine for Medicare-enrolled, Part D-covered beneficiaries with dementia during all nursing home stays in the measurement year. See above for details on how we identified Part D claims for cholinesterase inhibitors or memantine and Appendix Table 3 for a list of generic drug names for cholinesterase inhibitors or memantine.	MDS; PDE claims; Part D drug characteristics file
TOTCLMS_D_STRONGLY_ANTICHLNRGC	**Among residents with dementia in the facility, total number of claims for strongly anticholinergic medications.** This is the total number of drug fills for strongly anticholinergic medications for Medicare-enrolled, Part D-covered beneficiaries with dementia during all nursing home stays in the measurement year, excluding the first and last day of each nursing home stay (in case the fill was made in the community or other setting). To identify claims for strongly anticholinergic medications, we first compiled a list of generic drug names for medications with strongly anticholinergic properties from the 2023 American Geriatrics Society (AGS) Beers Criteria.[h] We then searched the drug characteristics file for all 11-digit NDCs associated with those drug names, searching in both brand and generic name fields. From this initial list of NDC codes, we created a list of unique nine-digit NDCs by dropping the last two digits from each NDC code (the last two digits describe the drug packaging). We then flagged all PDE claims for residents with dementia that matched the list of NDC codes for strongly anticholinergic medications on the first nine digits and where the fill date overlapped with a nursing home stay. See Appendix Table 3 for a list of generic drug names for strongly anticholinergic medications. *To calculate the number of strongly anticholinergic medication claims per resident year, please use N_D_MCARE_PTD_RESYRS as the denominator*	MDS; PDE claims; Part D drug characteristics file; AGS 2023 Beers Criteria
TOTDAYS_D_ STRONGLY_ANTICHLNRGC	**Among residents with dementia in the facility, total number of days' supply for strongly anticholinergic medications.** This is the total number of days' supply across all Part D claims for strongly anticholinergic medications for Medicare-enrolled, Part D-covered beneficiaries with	MDS; PDE claims; Part D drug characteristics file; AGS 2023 Beers Criteria

Variable name	Variable definition	Source data
	dementia during all nursing home stays in the measurement year. See above for details on how we identified Part D claims for strongly anticholinergic medications and Appendix Table 3 for a list of generic drug names for strongly anticholinergic medications.	

Note: For the set of clinical characteristics of residents with dementia on the first Thursday in April of the measurement year, we excluded conditions that were optional for states to report on quarterly assessments due to higher rates of missing data in these variables. The exclusions apply to the following conditions: atrial fibrillation or other dysrhythmia (I0300_DYSRHYTHMIA_CD); deep vein thrombosis, pulmonary embolus (PE), or pulmonary thrombo-embolism (PTE) (I0500_DVT_CD); cirrhosis (I1100_CRRHS_CD); gastroesophageal reflux disease or ulcer (I1200_GERD_CD); benign prostatic hyperplasia (I1400_BPH_CD); thyroid disorder (I3400_THYRD_CD); arthritis (I3700_ARTHTS_CD); osteoporosis (I3800_OSTPRS_CD); and cataracts, glaucoma, or macular degeneration (I6500_CTRCT_CD).

[a] For more information on the Bynum-Standard algorithm, see Grodstein, F., C.-H. Chang, A.W. Capuano, M.C. Power, D.X. Marquez, L.L. Barnes, D.A. Bennett, et al. "Identification of Dementia in Recent Medicare Claims Data, Compared With Rigorous Clinical Assessments." *The Journals of Gerontology, Series A,* vol. 77, no. 6, 2021, pp. 1272–1278. https://doi.org/10.1093/gerona/glab377. See Appendix Table 1 for a full list of dementia diagnosis codes.

[b] Please see the NDWS nursing home sample frame documentation for additional information on how we assigned RUCA codes and rural status. Available at: NH Waves 1 and 2 Sample Frame Overview.pdf

[c] In addition to the file(s) listed under the "Data Source" column for the specific measures, we also used the following data sources, as appropriate, to identify residents enrolled in Medicare and to identify Medicare-enrolled residents with dementia based on claims and encounter evidence: MBSF, Medicare FFS and MA inpatient, SNF, outpatient, home health, hospice, and carrier files.

[d] Thomas, K.S., D. Dosa, A. Wysocki, and V. Mor. "The Minimum Data Set 3.0 Cognitive Function Scale." *Medical Care*, vol. 55, no. 9, 2017, e68–e72. Available at: https://journals.lww.com/lww-medicalcare/pages/articleviewer.aspx?year=2017&issue=09000&article=00011&type=Fulltext.

[e] Morris, J.N., B.E. Fries, D.R. Mehr, C. Hawes, C. Phillips, V. Mor, and L.A. Lipsitz. "MDS Cognitive Performance Scale." *Journal of Gerontology*, vol. 49, no. 4, 2017, M174–M182. https://doi.org/10.1093/geronj/49.4.m174.

[f] Thomas, K.S., J.A. Ogarek, J. M. Teno, P.L. Gozalo, and V. Mor. "Development and Validation of the Nursing Home Minimum Data Set 3.0 Mortality Risk Score (MRS3)." *The Journals of Gerontology, Series A*, vol. 74, no. 2, 2019, pp. 219–225. Available at: https://pubmed.ncbi.nlm.nih.gov/29514187/.

[g] Ouslander, J.G., G. Lamb, M. Perloe, J.H. Givens, L. Kluge, T. Rutland, A. Atherly, and D. Saliba. "Potentially Avoidable Hospitalizations of Nursing Home Residents: Frequency, Causes, and Costs." *Journal of the American Geriatrics Society*, vol. 58, no. 4, 2010, pp. 627–635. Also see: Walsh, E.G., J.M. Wiener, S. Haber, A. Bragg, M. Freiman, and J.G. Ouslander. "Potentially Avoidable Hospitalizations of Dually Eligible Medicare and Medicaid Beneficiaries from Nursing Facility and Home- and Community-Based Services Waiver Programs." *Journal of the American Geriatrics Society*, vol. 60, no. 5, 2012, pp. 821–829. Also, for a publication with a list of ICD-10 diagnosis codes for potentially avoidable hospitalizations, see: Hamasaki, Y., N. Sakata, X. Jin, T. Sugiyama, K. Morita, K. Uda, S. Matsuda, and N. Tamiya. "Facility Staffing Associated with Potentially Avoidable Hospitalizations in Nursing Home Residents in Japan: A Retrospective Cohort Study." *BMC Geriatrics*, vol. 23, 2023, article 566.

[h] 2023 AGS Beers Criteria® Update Expert Panel. "The American Geriatrics Society 2023 updated AGS Beers Criteria® for potentially inappropriate medication use in older adults." *Journal of American Geriatrics Society*, vol. 71, no. 7, 2023, pp. 2052–2081. https://doi.org/10.1111/jgs.18372.

AGS = American Geriatrics Society; AHFS = American Hospital Formulary System; BIMS = Brief Interview for Mental Status; CFS = cognitive function score; CCN = CMS certification number; CMS = Centers for Medicare & Medicaid Services; CPS = cognitive performance score; ED = emergency department; ESRD = end-stage renal disease; FFS = fee-for-service; HCC = hierarchical condition category; MA = Medicare Advantage; MBSF = Master Beneficiary Summary File; MDS = minimum data set; MRS = mortality risk score; NDC = National Drug Code; PDE = Part D Event; RUCA = rural-urban commuting area; SNF = skilled nursing facility; UA = urban area; UC = urban cluster; USDA = U.S. Department of Agriculture.

Appendix Table 1. ICD-10 diagnosis codes to identify patients with dementia

Dementia diagnosis codes	Description
Bynum-standard algorithm[a,b]	
F01.50–F01.51	Vascular dementia
F02.80–F02.81	Dementia
F03.90–F03.91	Unspecified dementia
F04	Amnestic disorder
G30.0, G30.1, G30.8, G30.9	Alzheimer's disease
G31.01	Pick's disease
G31.09	Frontotemporal dementia
G31.83	Dementia with Lewy bodies
G31.1	Senile degeneration
G31.2	Degeneration of nervous system
R41.81	Age-related cognitive decline
New dementia-related ICD-10 codes effective as of October 1, 2022	
F01	Vascular dementia (non-billable code)
F015	Vascular dementia, unspecified severity (non-billable code)
F01.511	Vascular dementia, unspecified severity, with agitation
F01.518	Vascular dementia, unspecified severity, with other behavioral disturbance
F01.52	Vascular dementia, unspecified severity, with psychotic disturbance
F01.53	Vascular dementia, unspecified severity, with mood disturbance
F01.54	Vascular dementia, unspecified severity, with anxiety
F01.A	Vascular dementia, mild
F01.A0	Vascular dementia, mild, without behavioral disturbance, psychotic disturbance, mood disturbance, and anxiety
F01.A1	Vascular dementia, mild, with behavioral disturbance
F01.A11	Vascular dementia, mild, with agitation
F01.A18	Vascular dementia, mild, with other behavioral disturbance
F01.A2	Vascular dementia, mild, with psychotic disturbance
F01.A3	Vascular dementia, mild, with mood disturbance
F01.A4	Vascular dementia, mild, with anxiety
F01.B	Vascular dementia, moderate
F01.B0	Vascular dementia, moderate, without behavioral disturbance, psychotic disturbance, mood disturbance, and anxiety
F01.B1	Vascular dementia, moderate, with behavioral disturbance
F01.B11	Vascular dementia, moderate, with agitation
F01.B18	Vascular dementia, moderate, with other behavioral disturbance
F01.B2	Vascular dementia, moderate, with psychotic disturbance
F01.B3	Vascular dementia, moderate, with mood disturbance
F01.B4	Vascular dementia, moderate, with anxiety
F01.C	Vascular dementia, severe
F01.C0	Vascular dementia, severe, without behavioral disturbance, psychotic disturbance, mood disturbance, and anxiety
F01.C1	Vascular dementia, severe, with behavioral disturbance
F01.C11	Vascular dementia, severe, with agitation
F01.C18	Vascular dementia, severe, with other behavioral disturbance
F01.C2	Vascular dementia, severe, with psychotic disturbance
F01.C3	Vascular dementia, severe, with mood disturbance
F01.C4	Vascular dementia, severe, with anxiety
F02	Dementia in diseases classified elsewhere (non-billable code)
F028	Dementia in diseases classified elsewhere, unspecified severity
F02.811	Dementia in other diseases classified elsewhere, unspecified severity, with agitation
F02.818	Dementia in other diseases classified elsewhere, unspecified severity, with other behavioral disturbance

F02.82	Dementia in other diseases classified elsewhere, unspecified severity, with psychotic disturbance
F02.83	Dementia in other diseases classified elsewhere, unspecified severity, with mood disturbance
F02.84	Dementia in other diseases classified elsewhere, unspecified severity, with anxiety
F02.A	Dementia in other diseases classified elsewhere, mild
F02.A0	Dementia in other diseases classified elsewhere, mild, without behavioral disturbance, psychotic disturbance, mood disturbance, anxiety
F02.A1	Dementia in other diseases classified elsewhere, mild, with behavioral disturbance
F02.A11	Dementia in other diseases classified elsewhere, mild, with agitation
F02.A18	Dementia in other diseases classified elsewhere, mild, with other behavioral disturbance
F02.A2	Dementia in other diseases classified elsewhere, mild, with psychotic disturbance
F02.A3	Dementia in other diseases classified elsewhere, mild, with mood disturbance
F02.A4	Dementia in other diseases classified elsewhere, mild, with anxiety
F02.B	Dementia in other diseases classified elsewhere, moderate
F02B0	Dementia in other diseases classified elsewhere without behavioral disturbance, mood disturbance, and anxiety
F02.B1	Dementia in other diseases classified elsewhere, moderate, with behavioral disturbance
F02.B11	Dementia in other diseases classified elsewhere, moderate, with agitation
F02.B18	Dementia in other diseases classified elsewhere, moderate, with other behavioral disturbance
F02.B2	Dementia in other diseases classified elsewhere, moderate, with psychotic disturbance
F02.B3	Dementia in other diseases classified elsewhere, moderate, with mood disturbance
F02.B4	Dementia in other diseases classified elsewhere, moderate, with anxiety
F02.C	Dementia in other diseases classified elsewhere, severe
F02.C0	Vascular in other diseases classified elsewhere, without behavioral disturbance, psychotic disturbance, mood disturbance, and anxiety
F02.C1	Dementia in other diseases classified elsewhere, severe, with behavioral disturbance
F02.C11	Dementia in other diseases classified elsewhere, severe, with agitation
F02.C18	Dementia in other diseases classified elsewhere, severe, with other behavioral disturbance
F02.C2	Dementia in other diseases classified elsewhere, severe, with psychotic disturbance
F02.C3	Dementia in other diseases classified elsewhere, severe, with mood disturbance
F02.C4	Dementia in other diseases classified elsewhere, severe, with anxiety
F03	Unspecified dementia (non-billable code)
F039	Unspecified dementia (also non-billable)
F03.911	Unspecified dementia, unspecified severity, with agitation
F03.918	Unspecified dementia, unspecified severity, with other behavioral disturbance
F03.92	Unspecified dementia, unspecified severity, with psychotic disturbance
F0393	Unspecified dementia, unspecified severity, with mood disturbance
F03.94	Unspecified dementia, unspecified severity, with anxiety
F03.A	Unspecified dementia, mild
F03.A0	Unspecified dementia, mild, without behavioral disturbance, psychotic disturbance, mood disturbance, anxiety
F03.A1	Unspecified dementia, mild, with behavioral disturbance
F03.A11	Unspecified dementia, mild, with agitation
F03.A18	Unspecified dementia, mild, with other behavioral disturbance

F03.A2	Unspecified dementia, mild, with psychotic disturbance
F03.A3	Unspecified dementia, mild, with mood disturbance
F03.A4	Unspecified dementia, mild, with anxiety
F03.B	Unspecified dementia, moderate
F03.B0	Unspecified dementia, moderate, without behavioral disturbance, psychotic disturbance, mood disturbance, anxiety
F03.B1	Unspecified dementia, moderate, with behavioral disturbance
F03.B11	Unspecified dementia, moderate, with agitation
F03.B18	Unspecified dementia, moderate, with other behavioral disturbance
F03.B2	Unspecified dementia, moderate, with psychotic disturbance
F03.B3	Unspecified dementia, moderate, with mood disturbance
F03.B4	Unspecified dementia, moderate, with anxiety
F03.C	Unspecified dementia, severe
F03.C0	Unspecified dementia, severe, without behavioral disturbance, psychotic disturbance, mood disturbance, anxiety
F03.C1	Unspecified dementia, severe, with behavioral disturbance
F03.C11	Unspecified dementia, severe, with agitation
F03.C18	Unspecified dementia, severe, with other behavioral disturbance
F03.C2	Unspecified dementia, severe, with psychotic disturbance
F03.C3	Unspecified dementia, severe, with mood disturbance
F03.C4	Unspecified dementia, severe, with anxiety
G30	Alzheimer's disease (non-billable code)
G310	Frontotemporal dementia (non-billable code)

[a] Online supplementary materials from Grodstein, F., C.-H. Chang, A.W. Capuano, M.C. Power, D.X. Marquez, L.L. Barnes, D.A. Bennett, et al. "Identification of Dementia in Recent Medicare Claims Data, Compared with Rigorous Clinical Assessments." *The Journals of Gerontology, Series A,* vol. 77, no. 6, 2021, pp. 1272–1278. https://doi.org/10.1093/gerona/glab377.

[b] Per Grodstein et al. (2021): "These ICD codes are searched in the following claims files:
1) Any inpatient or skilled nursing facility claim
2) Home Health Agency: Any claim
3) Hospice: Any claim
4) Hospital Outpatient File (HOF) for outpatient medical services: Only claims from Rural Health Clinics, Federally Qualified Health Centers, and Critical Access Hospitals-Payment Option II
5) Carrier (Provider) File for services from physicians and other health care providers: Any claim, with the condition that there are two or more qualifying Carrier or HOF claims at least 7 days apart."
ICD-10 = International Classification of Diseases, 10th Revision.

Appendix Table 2. List of conditions and associated ICD-10 diagnosis codes that are potentially avoidable from the nursing home

Condition	ICD-10 codes
Anemia	D500, D501, D508, D509, D510, D511, D513, D518, D520, D521, D528, D529, D530–D532, D538, D539, D630, D638, D649
Congestive heart failure	I098, I110, I130, I132, I500, I501, I509, J81
Hypertension and hypotension	I10, I119, I129, I131, I951, I952, I958, I959
Poor glycemic control	E10, E11, E131, E15, E162, R730
Dehydration, volume depletion, acute renal failure, hyponatremia	E86, E876, N17, N170-N172, N178, N179, N258, N259, E871
Constipation, fecal impaction, obstipation	K564, K590
Diarrhea, gastroenteritis, Clostridium Difficile	A020, A030–A033, A038, A039, A040–A046, A048, A049, A050–A054, A058, A059, A060, A070–A073, A078, A079, A080–A083, A090, A099, K522, K523, K528, K529, A047
Skin ulcers, cellulitis	L890–L893, L899, L97, L984, L030–L033, L038, L039, L049, L080, L088, L089, L88, L980, E832
Lower respiratory pneumonia and bronchitis	J120–J122, J128, J129, J13, J14, J150–J159, J160, J168, J180, J189, J690, A481
Urinary tract infection	N10, N12, N159, N160–N165, N168, N300–N302, N308, N309, N340, N351, N37, N390, N410–N413, N418, N419, N51
Falls and trauma	S020, S021, S022, S023, S024, S026, S029, S120, S121, S122, S124, S125, S126, S128, S129, S220, S222, S223, S224, S225, S229, S320, S321, S322, S323, S324, S325, S326, S328, S329, S420, S421, S429, S422, S423, S424, S520, S521, S523, S524, S525, S536, S527, S529, S620, S621, S623, S625, S626, S629, S723, S724, S729, S820, S821, S822, S823, S824, S825, S829, S920, S921, S922, S923, S924, S925, S928, S929, S720, S721, S722, S030, S131, S331, S332, S333, S430, S431, S432, S530, S531, S630, S631, S730, S830, S831, S832, S930, S931, S933, S060, S061, S063, S064, S065, S066, S069, S049, S070, S079, S090, S098, S099, S119, S141, S142, S149, S179, S259, S269, S280, S298, S369, S379, S380, S381, S398, S449, S479, S489, S498, S570, S578, S598, S670, S672, S673, S698, S749, S77, S770, S771, S772, S798, S87, S870, S878, S898, S970, S971, S978, S014, S019, S211, S212, S310, S410, S411, S510, S710, S614, S615, S910, S911, S913, S009, T200, T201, T202, T203, T210, T211, T212, T213, T220, T221, T222, T223, T230, T231, T232, T233, T240, T241, T242, T243, T250, T251, T252, T253, T260, T261, T262, T264, T265, T266, T271, T280, T281, T282, T283, T284, T300, T310, T311, T312, T313, T314, T315, T316, T317, T318, T319, T07, T149, T159, T509, T659, T670, T671, T672, T673, T674, T675, T676, T677, T678, T679, T68, T698, T699, T711, T730, T731, T751, T754, T758, T788, T799, T889
Altered mental status, acute confusion, delirium psychosis, severe agitation, organic brain syndrome	F010–F013, F018, F019, F03, F050, D051, F058, F059, F199, F01, F060–F064, F068, F220, F228, F229, F230–F233, F238, F239, F24, F28, F29, F323, F333, F448, F530, F531, F538, F539
Chronic-obstructive pulmonary disease, asthma	J200, J209, J218, J40, J410, J411, J418, J42, J439, J441, J449, J47, J440, J441, J449, J459
Weight loss, nutritional deficiencies, seizures	R633, R634, R636, E40, E41, E43, E440, E441, E45, E46, E550, E643

Sources: Hamasaki, Y., N. Sakata, X. Jin, T. Sugiyama, K. Morita, K. Uda, S. Matsuda, and N. Tamiya. "Facility Staffing Associated with Potentially Avoidable Hospitalizations in Nursing Home Residents in Japan: A Retrospective Cohort Study." *BMC Geriatrics*, vol. 23, 2023, article 566. https://doi.org/10.1186/s12877-023-04278-2. Hamasaki et al. followed the definition of potentially avoidable hospitalizations developed by Walsh et al. (2012) and crosswalked the ICD-9 codes to corresponding ICD-10 codes.

Walsh, E.G., J.M. Wiener, S. Haber, A. Bragg, M. Freiman, and J.G. Ouslander. “Potentially Avoidable Hospitalizations of Dually Eligible Medicare and Medicaid Beneficiaries from Nursing Facility and Home- and Community-Based Services Waiver Programs.” *Journal of the American Geriatrics Society*, vol. 60, no. 5, 2012, pp. 821–829. https://doi.org/10.1111/j.1532-5415.2012.03920.x.

ICD-10 = International Classification of Diseases, 10th Revision.

Appendix Table 3. List of generic drug names for each drug class

Drug class	Generic drug names
Opioids[a]	Buprenorphine, Butorphanol, Codeine, Dihydrocodeine, Fentanyl, Hydrocodone, Hydromorphone, Levorphanol, Meperidine, Methadone, Morphine, Opium, Oxycodone, Oxymorphone, Pentazocine, Tapentadol, Tramadol
Antibiotics[a]	Amoxicillin, Ampicillin, Azithromycin, Aztreonam, Cefaclor, Cefadroxil, Cefazolin, Cefdinir, Cefditoren, Cefepime, Cefiderocol, Cefixime, Cefotaxime, Cefotetan, Cefoxitin, Cefpodoxime, Cefprozil, Ceftaroline, Ceftazidime, Ceftibuten, Ceftolozane, Ceftriaxone, Cefuroxime, Cephalexin, Ciprofloxacin, Clarithromycin, Clindamycin, Dalbavancin, Daptomycin, Delafloxacin Demeclocycline, Dicloxacillin, Doripenem, Doxycycline, Eravacycline, Ertapenem, Erythromycin, Fidaxomicin, Fosfomycin, Gemifloxacin, Gentamicin, Imipenem, Lefamulin, Levofloxacin, Lincomycin, Linezolid, Meropenem, Metronidazole, Minocycline, Moxifloxacin, Nafcillin, Neomycin, Nitrofurantoin, Norfloxacin, Ofloxacin, Omadacycline, Oritavancin, Oxacillin, Penicillin, Piperacillin, Plazomicin, Quinupristin, Rifamycin, Rifaximin, Sarecycline, Secnidazole, Streptomycin, Sulfadiazine, Sulfamethoxazole, Tedizolid, Telavancin, Telithromycin, Tetracycline, Ticarcillin, Tigecycline, Tinidazole, Tobramycin, Trimethoprim, Vancomycin, Amikacin
Antipsychotics[a]	Chlorpromazine, Fluphenazine, Haloperidol, Perphenazine, Aripiprazole, Brexpiprazole, Cariprazine, Clozapine, Lurasidone, Olanzapine, Paliperidone, Pimavanserin, Quetiapine, Risperidone, Ziprasidone, Asenapine, Iloperidone, Lumateperone, Loxapine, Molindone, Pimozide, Thioridazine, Thiothixene, Trifluoperazine
Antidepressants[b]	Isocarboxazid, Phenelzine, Tranylcypromine, Selegiline, Rasagiline, Desvenlafaxine, Duloxetine, Levomilnacipran, Venlafaxine, Milnacipran, Citalopram, Escitalopram, Fluoxetine, Fluvoxamine, Paroxetine, Sertraline, Vilazodone, Nefazodone, Trazodone, Vortioxetine, Amitriptyline, Amoxapine, Clomipramine, Desipramine, Doxepin, Imipramine, Maprotiline, Nortriptyline, Protriptyline, Trimipramine, Bupropion, Mirtazapine
Benzodiazepines/Z-drugs[b]	Alprazolam, Chlordiazepoxide, Clobazam, Clonazepam, Clorazepate, Diazepam, Estazolam, Flurazepam, Lorazepam, Midazolam, Oxazepam, Quazepam, Temazepam, Triazolam, Eszopiclone, Zaleplon, Zolpidem
Antiseizure medications[b]	Ethotoin, Fosphenytoin, Phenytoin, Ethadione, Paramethadione, Trimethadione, Ethosuximide, Mesuximide, Methsuximide, Brivaracetam, Carbamazepine, Eslicarbazepine, Felbamate, Gabapentin, Lacosamide, Lamotrigine, Levetiracetam, Oxcarbazepine, Perampanel, Pregabalin, Rufinamide, Stiripentol, Sultiame, Tiagabine, Topiramate, Valproate, Divalproex, Valproic acid, Vigabatrin, Zonisamide, Acetazolamide, Phenobarbital, Primidone
Cholinesterase inhibitors or memantine	Galantamine, Rivastigmine, Donepezil, Memantine
Strongly anticholinergic medications[c]	Amitriptyline, Amoxapine, Clomipramine, Desipramine, Doxepin, Imipramine, Nortriptyline, Paroxetine, Prochlorperazine, Promethazine, Brompheniramine, Chlorpheniramine, Cyproheptadine, Dimenhydrinate, Diphenhydramine, Doxylamine, Hydroxyzine, Meclizine, Triprolidine, Darifenacin, Fesoterodine, Flavoxate, Oxybutynin, Solifenacin, Tolterodine, Trospium, Benztropine, Trihexyphenidyl, Chlorpromazine, Clozapine, Olanzapine, Perphenazine, Atropine, Clidinium-chlordiazepoxide, Dicyclomine, Homatropine, Hyoscyamine, Scopolamine, Cyclobenzaprine, Orphenadrine

Sources: CMS Medicare Part D Prescribers by Provider and Drug data set. Available at: https://data.cms.gov/provider-summary-by-type-of-service/medicare-part-d-prescribers/medicare-part-d-prescribers-by-provider-and-drug.
AHFS Pharmacologic-Therapeutic Classification. The full 2019 AHFS list is publicly available at: https://www.oregon.gov/obnm/Documents/Formulary%20Information/AHFSClassificationwithDrugs2019.pdf.
2023 AGS Beers Criteria® Update Expert Panel. "The American Geriatrics Society 2023 updated AGS Beers Criteria® for Potentially Inappropriate Medication Use in Older Adults." *Journal of American Geriatrics Society*, vol. 71, no. 7, 2023, pp. 2052–2081. https://doi.org/10.1111/jgs.18372.

Note: The majority of generic drug names only belong to one drug class, except for certain antipsychotics and antidepressants which are also strongly anticholinergic.

[a] Lists of generic drug names for opioids, antibiotics, and antipsychotics are identified based on the CMS Medicare Part D Prescribers by Provider and Drug data set.

[b] Lists of generic drug names for antidepressants, benzodiazepines/Z-drugs, and antiseizure medications are identified based on the AHFS Pharmacologic-Therapeutic Classification. Generic drug names for antidepressants are identified by AHFS drug class code 28:16.04 (Antidepressants). Generic drug names for benzodiazepines/Z-drugs

are identified by AHFS drug class code 28:24.08 (Benzodiazepines) and selected drugs under drug class code 28:24.92 (Anxiolytics, Sedatives, and Hypnotics; Miscellaneous) for Z-drugs. Generic drug names for antiseizure medications are identified by AHFS drug class code 28:12.12 (Anticonvulsants: Hydantoins), 28:12.16 (Anticonvulsants: Oxazolidinediones), 28:12.20 (Anticonvulsants: Succinimides), 28:12.92 (Anticonvulsants: Miscellaneous), and 28:12.04 (Anticonvulsants: Barbiturates). Note that benzodiazepines commonly used to treat seizures listed under AHFS drug class code 28:12.08 are excluded from the list of antiseizure medications.

[c] The list of generic drug names for strongly anticholinergic medications is based on the AGS 2023 updated AGS Beers Criteria®. Per the Beers Criteria®, doxepin is only considered strongly anticholinergic when the daily dosage is above 6mg/day. We also applied this dosage criteria to identify claims/fills for doxepin as a strongly anticholinergic medication in Part D claims.

AGS = American Geriatrics Society; AHFS = American Hospital Formulary System; CMS = Centers for Medicare & Medicaid Services.