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Opioid Use in Long-Term Care Settings: Final Report

Prepared for
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by
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Office of the Assistant Secretary for Planning and Evaluation

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OPIOID USE IN LONG-TERM CARE SETTINGS: FINAL REPORT

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ACRONYMS

The following acronyms are mentioned in this report and/or appendix.

CDC	HHS Centers for Disease Control and Prevention
HHS	U.S. Department of Health and Human Services
LRx	Long-Term Care Prescription
LTC	LTC (Long-Term Care)
MME	Morphine Milligram Equivalent
NF	Nursing Facility
OUD	Opioid Use Disorder
SNF	Skilled Nursing Facility

EXECUTIVE SUMMARY

Using pharmacy claims data from IQVIA, this project tracked the use of pain medications across retail and long-term care (LTC) pharmacy settings. IQVIA data cover a large portion of these pharmacy markets nationally and capture prescription drug claims across payers, including medications covered through Medicare's bundled skilled nursing facility (SNF) payments. Our study findings are based on a sample of individuals aged 65 and above who were admitted to LTC (a category that includes nursing homes (SNFs and nursing facilities [NFs]) and assisted living facilities) and received opioid or non-opioid pain medications there between July 1, 2018, and June 30, 2019.

Around three-quarters of our study sample had at least one opioid prescription during their initial LTC stay. The vast majority (83%) was opioid "naïve" before their LTC admission. This proportion differed considerably depending on whether individuals remained in the LTC setting during our study period or were discharged back to the community, presumably following a post-acute SNF stay. Twenty-nine percent (29%) of discharged residents had opioid use in the 45 days before their LTC admission, compared to only 10% of residents who remained in the LTC facility. This difference could reflect conditions that more typically result in post-acute SNF stays, including procedures that may be precipitated by pain that is difficult to manage.

Although most discharged residents had opioid use in the first three days in the LTC setting, many of these individuals were no longer taking opioids by the end of their stay. This pattern was different for residents who were not discharged and remained in the facility for longer stays. Relative to discharged residents, opioid use for non-discharged residents was generally lower during the first three days in the LTC facility; this use declined only modestly for these residents by day 30 of the LTC stay. Among the roughly one-third of residents in our sample who had benzodiazepine use, almost all had concurrent use of an opioid and a benzodiazepine during their LTC stay, despite the U.S. Department of Health and Human Services (HHS) Centers for Disease Control and Prevention (CDC) 2016 guidelines advising against this practice.

Around one-fourth of all discharged individuals (26%) had a retail claim for opioids within seven days of discharge, something that was relatively common for those with opioid use during the last three days of the LTC stay. A sizeable minority of discharged individuals had longer-term or chronic opioid use during the post-discharge period. Among those who had retail claims only during the 180 days following LTC discharge, 16% had at least 90 days supply of opioids during their first 180 days in the community.

In sum, opioid use was very common among the LTC residents in our sample. Perhaps reflecting their post-acute rehabilitative needs, discharged residents were more likely to have opioid use prior to LTC admission and at the beginning of the LTC stay. Opioid use diminished over the course of the LTC stay for this group, but a sizeable minority of these individuals still

had opioid use once discharged to the community, some of which developed into longer-term or chronic use. The non-discharged individuals in our sample generally had lower opioid use prior to LTC admission and at the beginning of the LTC stay. Over the course of their LTC stay, however, opioid use by non-discharged residents dropped only modestly, sometimes with problematic benzodiazepine use added to their medications.

INTRODUCTION

The opioid epidemic has had a substantial impact on older Americans. Almost one-in-three Medicare Part D beneficiaries received an opioid such as oxycodone or fentanyl in 2016, and 500,000 of these individuals received high amounts (average morphine equivalent dose of >120 mg per day for at least three months).[1] Older people are at higher risk for adverse events from opioid use,[2] and Medicare beneficiaries recently accounted for almost one-third of hospital stays related to opioid overuse.[3]

To date, policymakers and professional societies have focused largely on ways to reduce community prescribing of opioids, specifically using Medicare Part D claims data to identify at-risk individuals and clinicians with questionable prescribing patterns.[1,4-6] Yet, Part D claims data alone offer few insights into care that beneficiaries receive during hospital and SNF stays, since medications for these stays are included in the bundled inpatient and SNF payment rates. In addition, state prescription drug monitoring programs often exempt hospitals and nursing homes (including SNFs and NFs) from reporting the controlled drugs that are prescribed and dispensed.[7] Despite these blind spots in monitoring, many Medicare beneficiaries are exposed to powerful opioids for the first time during a hospital stay.[8] Patients who were opioid-naïve prior to hospitalization (i.e., had not filled an opioid prescription in a specified period before the hospitalization) and who are discharged while still taking opioids are at substantial risk of becoming chronic opioid users.[9-11]

For many older people who are hospitalized, nursing homes are a key setting in which individuals' pain can be managed during a SNF rehabilitation stay, especially to facilitate maintenance and improvement in physical functioning. Over 2 million Medicare beneficiaries access SNF care each year following hospitalizations for planned surgical procedures, emergent conditions, and unexpected traumas.[12] Given the high prevalence of pain among nursing home residents and the inclusion of associated measures on the *Nursing Home Compare* public reporting website, pain management is a priority concern for nursing home providers, clinicians, and oversight agencies.[13]

Opioids can be an effective treatment option for pain affecting older individuals receiving short-term post-acute care and LTC services in nursing homes and assisted living facilities. However, frail older people also face elevated risks of adverse events, especially with long-term use.2 The risk of transitioning from acute to chronic opioid use among the adult population increases after the third day supplied and rises rapidly thereafter, pointing to the influence of initial prescribing decisions.[14] A related risk, highlighted by studies of hospitalized Medicare beneficiaries, is that patients being discharged while still receiving opioids are at higher risk for developing longer-term chronic opioid use. Therefore, the time spent in a post-acute SNF stay, almost a month on average for Medicare beneficiaries,[15] is an especially important juncture for opioid prescribing and represents an opportunity to wean patients from these powerful drugs.[16,17]

Little is known about the important window of time leading up to and, in some cases, emerging from the SNF stay, including whether opioid use trajectories and their implications differ across distinct sub-populations. For instance, opioid use and its effects may differ depending on

whether a person enters the nursing home for a short-term SNF rehabilitation stay (e.g., for major joint replacement) before returning home or enters the nursing home and then transitions to long-stay status following a stroke, fall, or extended cognitive decline.[18-20] With these considerations as context, the CDC issued Guidelines for Opioid Treatment of Patients with Chronic Pain in 2016.[21] Although the guidelines emphasize the variability that can exist across clinical populations (and, in fact, are aimed at primary care physicians practicing in community settings), guiding principles include viewing non-pharmacologic and non-opioid therapy as being the preferred starting point for treating chronic pain and -- when prescribing opioids: (i) starting with the lowest effective dose of an opioid (<50 morphine milligram equivalents (MMEs) whenever possible and above 90 MMEs only when justified); (ii) starting with an immediate-release or short-acting opioid for the minimal duration of time possible (often less than three days and rarely more than seven days); (iii) avoiding concurrent opioid and benzodiazepine use whenever possible; and (iv) assessing risk and addressing harms of opioid use as opioid therapy continues. The 2016 CDC recommendation to avoid concurrent prescribing of opioids and benzodiazepines whenever possible is the primary rationale for why our study examines the concurrent use of opioids with benzodiazepines and with Z-drugs (which have similar properties[22]) among the study sample. The 2016 CDC Guideline for Prescribing Opioids for Chronic Pain is in the process of being updated to include new evidence and recommendations on acute, sub-acute, and chronic pain.

Some studies have examined the frequency of opioid use in nursing homes, but the limited literature in this area has focused mostly on prescribing trends among long-stay residents using Medicare Part D claims and largely ignored the flow of patients who cycle through facilities during their SNF stays, before being discharged back to the community or transitioning to long-stay status.[23-25] These studies use Medicare Part D data, which cannot offer insights about medication use among post-acute SNF residents. For each post-acute SNF stay, Medicare pays the SNF a prospective payment that bundles together medications and other necessary services, thus excluding SNF medication prescriptions from Part D claims. Given that the majority of nursing home residents enter the facility through a SNF stay, this information gap is significant and misses entirely the sizeable population who are hospitalized, enter the SNF for rehabilitation, and then return to the community. This research project uses an alternative data source (IQVIA) to learn more about the use of opioids by individuals in LTC settings, including those using the Medicare SNF benefit.

PROJECT DESCRIPTION

In this project, prepared for the HHS Office of Behavioral Health, Disability, and Aging Policy, we sought to improve our understanding of the prescribing of opioids to individuals receiving post-acute and LTC services, especially as they transition from the community, to the SNF, and back to the community. We utilize retail and LTC pharmacy claims data from IQVIA, a data science company with extensive analytic capabilities that are used in part to convey information to pharmaceutical and financial companies to measure market and product demand for prescription medications. IQVIA data resources have the advantage of being both comprehensive and up-to-date. As we describe in more detail below, the IQVIA LTC channel includes prescription claims administered through nursing homes, assisted living facilities, and community mental health centers; the IQVIA retail channel includes prescription claims administered through community and mail-order pharmacies. These data reportedly capture claims for around three-quarters of all nursing home and assisted living residents nationally and around 95% of all community prescriptions nationally. In addition, our study data from calendar years 2018 and 2019 offer an up-to-date view of opioid use and pain management as individuals transition from the community to nursing homes and assisted living facilities, and, in some cases, back to the community. A key objective of the project is to generate better information on prescribing practices to help target quality assurance and improvement efforts and address concerns on how to better assess and improve pain management for individuals receiving post-acute and LTC services.

Given the parameters of the IQVIA data relative to the initial project aims, we used the IQVIA data to accomplish the following:

- Analyze opioid and non-opioid pain medication use for older (65+) individuals receiving post-acute and LTC services in 2018 and 2019. In addition to opioids, we analyzed the use of non-opioid medications commonly used to treat pain in this population (including acetaminophen, ibuprofen, nonsteroidal anti-inflammatory drug, gabapentin, pregabalin, lamotrigine, and topiramate) to examine the extent to which individuals used non-opioid pain medications. We also assessed use of benzodiazepines and non-benzodiazepine "Z" drugs (zolpidem, eszopiclone, and zaleplon), both of which can be clinically problematic when prescribed in combination with opioids.

- Determine if there are distinct opioid and pain prescribing trends across resident age, sex, and geography (we primarily focused on region). The analyses included all older individuals who were newly-admitted to nursing homes and assisted living facilities between July 2018 and June 2019. Because we were unable to distinguish between individuals in nursing homes and assisted living facilities in the IQVIA LTC data, our analyses distinguished between residents who were discharged from these settings back to the community and those who remained in these settings throughout the study period.

- Utilizing the merged LTC and community pharmacy claims, identify LTC residents who were admitted to the LTC setting after taking opioids in the community (i.e., not opioid-

naïve) compared to residents who started opioids at some point during their LTC stay who were opioid-naïve before admission.

- Examine the role of the LTC facility (generally, as the IQVIA data do not have individual facility indicators) in managing pain and the impact this role has on subsequent opioid use trajectories. For individuals who are admitted to the LTC setting from the community, for instance, how is opioid use managed in the LTC setting over the stay and what proportion of LTC opioid users fill opioid prescriptions after they are discharged to the community?

METHODS

Data and Approach

Our analyses used all pharmacy data from IQVIA for calendar years 2018 and 2019. IQVIA maintains several relevant databases, and the project used information from the community "LRx" and "LTC LRx" products. IQVIA's LTC LRx (long-term care prescription) data include data for nursing home (both NFs and SNFs) and assisted living residents nationwide. Our IQVIA data did not allow us to distinguish between individuals in these two settings. Consequently, we refer generally to individuals in our sample as "LTC residents", even though they might be in nursing homes (SNFs and NFs) or assisted living facilities. Importantly, these data include claims for all medications dispensed in these settings, regardless of payer, including medications (e.g., acetaminophen) that would be available over-the-counter outside of the LTC setting and medications that were included in bundled SNF payments.

Although each drug claim included payer source information (e.g., Medicare Part A, Medicare Part D, fee-for-service Medicaid, managed Medicaid, cash, or commercial), our initial analyses highlighted uncertainty about these variables. Consequently, to examine medication use by short-stay post-acute residents versus LTC residents, we focused on discharged and non-discharged residents, with the former group returning the community and the latter group remaining in the LTC setting for the rest of the study period. In other words, we approximated the SNF population by focusing on individuals who went from the community (i.e., had IQVIA retail claims), to the nursing home or assisted living facility (i.e., had IQVIA LTC claims), and back to the community again (i.e., had IQVIA retail claims). We cannot be certain of the overlap between individuals identified in this way and those who truly received post-acute SNF care; however, the length of stay for the discharged population was comparable with the SNF population nationally, with mean and median lengths of stay of 50 and 30 days, respectively. In contrast, the mean and median length of stay of our non-discharged population was 184 and 139 days, respectively.

Data in IQVIA's LTC data channel also included a relatively smaller number of people treated in community mental health centers. Because these individuals were outside our primary research focus, we limited the inclusion of these individuals in our sample by restricting analyses to those aged 65 and older. As a sensitivity check, we limited analyses further to include only those aged 80 and above. These results were largely the same as our main findings and are not presented. As noted above, the IQVIA data reportedly capture claims for around three-quarters of all nursing home residents nationally and around 95% of all community prescriptions nationally.

Data Variables/Specification

- All medications used by the study population in both the IQVIA Community LRx and LTC LRx databases over the study period were included. Each prescription claim included the unique patient identifier, service date, quantity dispensed, refill indicator,

product supply day count, product name, product form, product strength, and product identification number. As described above, our analyses relied on individuals' transitions between the retail and LTC data channels to separate discharged (to approximate post-acute) and non-discharged (to approximate LTC) residents.

- Patient demographics, including sex, age (with age 85+ coded as age 85), and three-digit zip code (used in the regional analyses); patient first fill date; and patient last fill date.

- Before restricting our sample to those age 65 and above, the IQVIA data we received included roughly 14 million prescription claims for 43,000 distinct medications for 1.4 million patients.

Analyses

To examine the use of medications for individuals across the nursing home and community settings, we merged IQVIA's LTC LRx data with the standard community LRx data, using a common patient ID across these datasets. Using the IQVIA data, the project identified all individuals who filled a LTC LRx prescription for a pain medication during the one-year period starting July 1, 2018, and ending June 30, 2019. Pain medications included opioid medications plus non-opioid pain medications commonly used to treat pain in this population, including non-narcotic analgesics, anti-inflammatory analgesics, gabapentinoids, lamotrigine, and topiramate. For individuals with at least one pain medication claim in the LTC LRx file during this one-year window, we then collected all of their 2018 and 2019 drug claims filled in the community and in the LTC setting.

Because of how we identified our sample in the IQVIA data, our analyses focused on those who were admitted to the LTC setting between July 1, 2018, and June 30, 2019 (i.e., their first LTC claim in either 2018 or 2019 was during this time period). For instance, if individuals were already in the LTC setting at the start of our study period (i.e., making the date of their first LTC claim hidden), we did not include them in the analyses. Where relevant, we distinguished medication use across time periods before LTC admission, during LTC stay, and (if applicable) following LTC discharge. For instance, a particular interest, and strength of using the IQVIA data, was the ability to track medication use from the community, to the LTC setting, and back to the community.

Further, reflecting the focus on older LTC residents, our primary analyses focused on individuals 65 years of age and older, and we also stratified many analyses by age (e.g., including a category with age 85+). In addition to being our primary research focus, restricting the sample to those who were older minimized the extent to which younger patients at community mental health centers were included in our analyses.

As a foundation for our work, we examined opioid and non-opioid pain medication use in the LTC setting among our sample population, stratifying results by age, sex, and geographic region. Medications of interest included:

- Opioid pain medications.
- Benzodiazepines.
- Non-benzodiazepine "Z" drugs (zolpidem, eszopiclone, and zaleplon).
- Non-opioid pain medications (e.g., non-narcotic analgesic, anti-inflammatory analgesics, gabapentinoids, lamotrigine, and topiramate).

Descriptive analyses examined opioid and non-opioid pain medication use by different populations at different points in time. As described above, the focus of our analyses was on individuals who were admitted to the nursing home (SNF or NF) or assisted living facility from the community, spent some period of time in this setting, and then were either discharged back to the community (the discharged population) or remained in the nursing home or assisted living facility (the non-discharged population). For both of the discharged and non-discharged populations, the period of time immediately following facility admission was of particular interest, largely because the medication claims to assess opioid use during these transitions of care have been unavailable in many prior analyses using Part D claims (because of the bundling of drugs into SNF payments to nursing homes).

Within this group, we analyzed pain medication use outcomes for several sub-populations, stratifying by the following conditions in addition to sex, age, and geography:

- Opioid-naïve status in the 45 days leading up to the first LTC claim (Y/N).
- LTC discharge status (Y/N).

Our initial analyses also assessed the following outcomes:

Any opioid use (Y/N) during the LTC stay:

- If YES, most frequently used medications (e.g., short-acting vs. long-acting opioids and specific formulations).

- If YES, proportion with a LTC opioid prescription claim filled within three days of the first LTC claim.

- For those discharged from the LTC setting, the proportion of opioid users who have any LTC opioid days supply remaining within three days of LTC discharge date.

- For those not discharged from the LTC setting, the proportion of opioid users who have any LTC opioid days supply remaining at day 30 of their LTC stay.

- For those with opioid use at the beginning of the LTC stay and NOT at the end of the LTC stay, we will estimate the proportion of these individuals who have non-opioid pain medication use at the end of the LTC stay, meaning within the last three days before LTC discharge date.

- Among those with LTC opioid use, we assessed whether these individuals had any concurrent use of opioids and: (a) benzodiazepines; and (b) non-benzodiazepine Z-drugs (defined as having overlapping days supply of these medications in LTC claims).

Finally, for individuals who are discharged from the LTC setting, we also examined several opioid medication use outcomes for the period of time following LTC discharge, including:

- The proportion with an opioid prescription within seven days of LTC discharge based on retail claims, stratified by LTC opioid use status (Y/N).

- The proportion with 90 or more days supply of opioid medications during the six months after LTC discharge.

- The proportion with 30 or more days supply of opioid medications during the three months after LTC discharge.

- The proportion with any fills for an opioid use disorder (OUD) medication (i.e., methadone, buprenorphine, naltrexone) within six months after LTC discharge and within three months after LTC discharge.

Limitations

There are several potential limitations with the IQVIA data on which we will base our analyses. First, although the IQVIA data include the vast majority of the LTC and retail markets, these data are not universal across the two settings. Perhaps more important, IQVIA's LTC data include claims from several institutional settings, including nursing homes, assisted living facilities, and community mental health centers. Importantly, we are unable to distinguish between these settings in our analyses and thus use the general term "LTC Residents" to describe the sample. By limiting our analyses to individuals aged 65 and above and by stratifying our results on age, we are confident that our analyses will focus predominantly on individuals in LTC settings. Second, the payer source information (e.g., Medicare Part D, Medicare Part A, Medicaid, etc.) for IQVIA would not allow us to distinguish post-acute SNF stay (financed by Medicare Part A) from Part A financed stays for hospice enrollees or from other LTC stays. However, we used information on setting identified in the IQVIA data (i.e., LTC vs. retail/community) and other fields to identify individuals who were admitted to the LTC setting from the community and who were then either discharged back to the community or remained in the facility longer-term. Finally, we have limited information about patients (age, sex, and three-digit zip code), including a lack of diagnostic or health information, and no information on the LTC facilities in which people reside.

RESULTS

LTC Resident Characteristics

Exhibits 1A, 1B, and 1C display the distribution by sex, age, and region of individuals in our selected analytic sample. As detailed above, we selected individuals with a first LTC claim occurring between July 1, 2018, and June 30, 2019, and who were using either an opioid or non-opioid pain medication during their LTC stay. The exhibits below show demographic traits of: (1) the full sample of these individuals; (2) those who were discharged from the LTC setting during our study period; and (3) those who were not discharged from the LTC setting. For these three groups, we show age, sex, and region distributions for: (a) all of these individuals; (b) those with LTC opioid use; and (c) those with LTC non-opioid pain medication use.

Highlights

- Among all with LTC claims in our selected sample, around three-fourths had opioid pain medication use, and half had non-opioid pain medication use during the LTC stay, figures that were similar across residents who were discharged compared to the longer stay non-discharged residents.

- The discharged sample had fewer individuals in the 85+ age category and a larger proportion of women who used opioid pain medication.

Exhibit 1A. LTC Resident Characteristics: Full Sample

	All LTC Residents		Residents w/LTC Opioid Pain Medication Use		Residents w/LTC Non-Opioid Pain Medication Use	
	N	%	N	%	N	%
Total	729,011	100%	529,311	73%	362,129	50%
Sex						
Female	456,742	63%	334,669	63%	230,770	64%
Male	272,269	37%	194,642	37%	131,359	36%
Age						
65-74	247,731	34%	176,986	33%	134,634	37%
75-84	238,906	33%	175,892	33%	118,095	33%
85+	242,374	33%	176,433	33%	109,400	30%
Region						
Northeast	152,515	21%	104,609	20%	71,523	20%
Midwest	189,428	26%	140,244	26%	100,651	28%
South	242,953	33%	170,576	32%	121,793	34%
West	144,115	20%	113,882	22%	68,162	19%

Exhibit 1B. LTC Resident Characteristics: Discharged Sample						
	All Discharged Residents		Discharged Residents w/LTC Opioid Pain Medication Use		Discharged Residents w/LTC Non-Opioid Pain Medication Use	
	N	%	N	%	N	%
Total	270,704	100%	197,642	73%	128,179	47%
Sex						
Female	181,158	67%	134,697	68%	86,835	68%
Male	89,546	33%	62,945	32%	41,344	32%
Age						
65-74	102,579	38%	75,577	38%	53,894	42%
75-84	91,366	34%	67,875	34%	42,845	33%
85+	76,759	28%	54,190	27%	31,440	25%
Region						
Northeast	59,389	22%	40,980	21%	27,242	21%
Midwest	66,457	25%	49,740	25%	32,541	25%
South	95,608	35%	67,870	34%	46,966	37%
West	49,250	18%	39,052	20%	21,430	17%

Exhibit 1C. LTC Resident Characteristics: Non-Discharged Sample						
	All Non-Discharged Residents		Non-Discharged Residents w/LTC Opioid Pain Medication Use		Non-Discharged Residents w/LTC Non-Opioid Pain Medication Use	
	N	%	N	%	N	%
Total	458,307	100%	331,669	72%	233,950	51%
Sex						
Female	275,584	60%	199,972	60%	143,935	62%
Male	182,723	40%	131,697	40%	90,015	38%
Age						
65-74	145,152	32%	101,409	31%	80,740	35%
75-84	147,540	32%	108,017	33%	75,250	32%
85+	165,615	36%	122,243	37%	77,960	33%
Region						
Northeast	93,126	20%	63,629	19%	44,281	19%
Midwest	122,971	27%	90,504	27%	68,110	29%
South	147,345	32%	102,706	31%	74,827	32%
West	94,865	21%	74,830	23%	46,732	20%

Across the full, discharged, and non-discharged samples, around two-thirds of individuals were female (63%, 67%, 60%). In the full sample, roughly one-third of all residents were in the 65-74, 75-84, and 85+ age categories. Relative to the non-discharged population, the discharged population was generally younger and had fewer individuals in the oldest age category -- 28% of discharged individuals were in the 85+ age category compared to 36% of non-discharged residents. In the full analytic sample, the highest proportion of individuals came from the South (35%), followed by the Midwest (25%), the Northeast (22%), and the West (18%). These proportions were comparable across sample populations and by opioid and non-opioid use status.

Opioid Characteristics by Resident Discharge Status

Exhibit 2A displays the proportion of long-acting and short-acting opioids received across the full sample and for discharged and non-discharged residents prior to, during, and after the LTC stay. Exhibit 2B displays a list of the ten most commonly prescribed opioid medications during

the LTC stay, by discharge status. The Appendix also includes the most commonly prescribed opioids across the pre-LTC, LTC, and post-LTC time periods.

Highlights

- The vast majority of opioids prescribed prior to LTC admission and during the LTC stay are short-acting opioids for both discharged and non-discharged patients.

- During the LTC stay, a higher proportion of opioid prescriptions were short-acting for those who were discharged (93%) relative to those who were not discharged (87%).

Exhibit 2A. Proportion of Claims for Long-Acting and Short-Acting Opioids, by Resident Discharge Status

	Full Sample		Discharge Sample		Non-Discharge Sample	
	N	%	N	%	N	%
Prior to LTC Admission						
Long-Acting	149,433	12%	90,272	11%	59,161	13%
Short-Acting	1,110,564	88%	705,915	89%	404,649	87%
During LTC Stay						
Long-Acting	254,037	11%	44,326	7%	209,711	13%
Short-Acting	1,955,577	89%	555,150	93%	1,400,427	87%
After LTC Discharge						
Long-Acting	---	---	70,163	10%	---	---
Short-Acting	---	---	600,820	90%	---	---

Exhibit 2B. Most Prescribed Opioid Medications During the LTC Stay, by Resident Discharge Status

Duration Status	Product Name	N	%
Discharged Sample			
Short-Acting	HYDROCODONE/ACETAMINOPHEN	178,297	29.7%
Short-Acting	TRAMADOL HCL	121,964	20.3%
Short-Acting	OXYCODONE HYDROCHLORIDE	121,417	20.2%
Short-Acting	OXYCODONE/ACETAMINOPHEN	85,956	14.3%
Short-Acting	ACETAMINOPHEN/CODEIN	13,896	2.3%
Short-Acting	HYDROMORPHONE HCL	13,534	2.3%
Long-Acting	FENTANYL	13,061	2.2%
Long-Acting	MORPHINE SULFATE ER	11,761	2.0%
Short-Acting	MORPHINE SULFATE	10,608	1.8%
Long-Acting	OXYCONTIN	8,365	1.4%
Non-Discharged Sample			
Short-Acting	HYDROCODONE/ACETAMINOPHEN	403,788	24.8%
Short-Acting	TRAMADOL HCL	362,142	22.3%
Short-Acting	OXYCODONE HYDROCHLORIDE	212,385	13.1%
Short-Acting	MORPHINE SULFATE	182,295	11.2%
Short-Acting	OXYCODONE/ACETAMINOPHEN	139,078	8.6%
Long-Acting	FENTANYL	87,900	5.4%
Long-Acting	MORPHINE SULFATE ER	53,174	3.3%
Short-Acting	ACETAMINOPHEN/CODEIN	39,376	2.4%
Short-Acting	HYDROMORPHONE HCL	36,341	2.2%
Long-Acting	METHADONE HCL	27,169	1.7%

The majority of opioid claims for our full sample were short-acting opioids as opposed to long-acting opioids, with 88% prior to LTC admission and 89% during the LTC stay having been short-acting. In claims for discharged residents, the same pattern holds following discharge, as 90% of post-LTC discharge claims for opioids are for short-acting opioids while 10% are for long-acting opioids. During the LTC stay, a higher proportion of opioid prescriptions were short-acting for those who were discharged (93%) relative to those who were not discharged (87%). The most commonly prescribed opioid medications during the LTC stay are similar between discharged and non-discharged individuals. The bulk of medications prescribed to discharged residents were comprised of three medications -- hydrocodone/acetaminophen, tramadol HCL, and oxycodone hydrochloride (cumulatively 70% of prescribed opioid medications). Claims among the non-discharged sample are similarly concentrated, although morphine sulfate is more prominent among prescribed opioids for the non-discharged sample, representing 11% of their opioid claims (relative to 1.8% among discharge residents).

Opioid-Naïve and Non-Naïve Residents, by Discharge Status

Exhibit 3A displays the sex, age, and region of those residents who were opioid-naïve prior to their LTC stay, meaning they did not have any retail opioid claims in the 45 days prior to their first LTC claim, by discharge status. Exhibit 3B displays those same characteristics but for those residents who were not opioid-naïve, meaning they did have a retail opioid claim in the 45 days prior to their first LTC claim, by discharge status.

Highlights

- The vast majority of residents in our sample (83%) were opioid-naïve before admission. A little more than two-thirds of discharged (or shorter-term) residents were opioid-naïve and nine-in-ten non-discharged (or longer-term) residents were opioid-naïve.

- Compared to the non-discharged sample, discharged residents had around three times the rate of opioid use in the 45 days before admission to the LTC setting (29% vs. 10%).

- Among the discharged sample, residents with prior opioid use were more likely to be younger relative to the opioid-naïve population.

- Relative to other geographic regions, a higher proportion of LTC residents in our sample from the Northeast were opioid-naïve prior to their first LTC claim.

Exhibit 3A: Opioid-Naïve Residents: By Discharge Status						
	Full Sample		Discharged Sample		Non-Discharged Sample	
	N	%	N	%	N	%
Total Naïve	604,624	83%	192,376	71%	412,248	90%
Sex						
Female	373,920	62%	126,801	66%	247,119	60%
Male	230,704	38%	65,575	34%	165,129	40%
Age						
65-74	199,413	33%	69,427	36%	129,986	32%
75-84	198,383	33%	65,155	34%	133,228	32%
85+	206,828	34%	57,794	30%	149,034	36%
Region						
Northeast	130,456	22%	45,053	23%	85,403	21%
Midwest	156,455	26%	46,775	24%	109,680	27%
South	198,668	33%	66,587	35%	132,081	32%
West	119,045	20%	33,961	18%	85,084	21%

Exhibit 3B: Opioid Non-Naïve Residents: By Discharge Status						
	Full Sample		Discharged Sample		Non-Discharged Sample	
	N	%	N	%	N	%
Total Non-Naïve	124,387	17%	78,328	29%	46,059	10%
Sex						
Female	82,822	67%	54,357	69%	28,465	62%
Male	41,565	33%	23,971	31%	17,594	38%
Age						
65-74	48,318	39%	33,152	42%	15,166	33%
75-84	40,523	33%	26,211	33%	14,312	31%
85+	35,546	29%	18,965	24%	16,581	36%
Region						
Northeast	22,059	18%	14,336	18%	7,723	17%
Midwest	32,973	27%	19,682	25%	13,291	29%
South	44,285	36%	29,021	37%	15,264	33%
West	25,070	20%	15,289	20%	9,781	21%

A total of 604,624 individuals were identified as opioid-naïve before admission to the LTC setting, comprising 83% of the full sample, 71% of the discharged sample, and 90% of the non-discharged sample. Among discharged residents, who were considerably more likely than non-discharged residents to have opioid use prior to LTC admission (29% vs. 10% of these two groups had pre-LTC opioid use, respectively), younger individuals were more likely to have opioid use during the pre-LTC period. Among the discharged sample, residents aged 65-74 were 42% of those with opioid use prior to the LTC stay (non-naïve) relative to 36% of those without opioid use (naïve). Across the discharged and non-discharged samples, residents in the Northeast were less likely to have opioid use in the pre-LTC time period (accounting for 18% of the non-naïve residents, and 22% of naïve residents).

Opioid Use Across Their LTC Stay, by Naïve Status

Exhibit 4 displays opioid use in the first three days of the LTC stay and at a later point during the stay. For discharged residents, we examine opioid use during the first three days of the LTC stay and the last three days of the stay prior to discharge. For non-discharged residents, we examine

opioid use in the first three days of the LTC stay and at day 30 of the LTC stay. For the full sample, we describe opioid use during the first three days of the LTC stay only and do not combine the discharged and non-discharged groups later in the LTC stay. For all of these groups, we stratify the results by opioid-naïve status.

Highlights

- Across our entire study sample, individuals with opioid use in the community prior to admission were more likely to have opioid use in the first three days of their stay in the LTC setting.

- Opioid use in the first three days of the LTC stay was especially high among the discharged population, likely reflecting their post-acute rehabilitative needs. Fewer non-discharged residents had opioid use during this time period, especially among those who were opioid-naïve prior to admission.

- Among discharged residents, opioid use had dropped considerably in the days leading up to discharge. Among non-discharged residents, opioid use rates dropped only modestly between admission and day 30 of the LTC stay, suggesting distinct needs from the shorter-term discharged population.

Exhibit 4: Residents' Opioid Use Across the LTC Stay, by Naïve Status

	All		Naïve Prior to Admission		Not Naïve Prior to Admission	
	N	%	N	%	N	%
Full Sample						
Total	529,311	100%	418,738	79%	110,573	21%
Use in First 3 Days						
No	159,555	30%	142,078	34%	17,477	16%
Yes	369,756	70%	276,660	66%	93,096	84%
Discharged Sample						
Total	197,642	100%	128,943	65%	68,699	35%
Use in First 3 Days						
No	30,624	15%	22,708	18%	7,916	12%
Yes	167,018	85%	106,235	82%	60,783	88%
Use in Last 3 Days						
No	135,736	69%	96,390	75%	39,346	57%
Yes	61,906	31%	32,553	25%	29,353	43%
Non-Discharged Sample						
Total	331,669	100%	289,795	87%	41,874	13%
Use in First 3 Days						
No	128,931	39%	119,370	41%	9,561	23%
Yes	202,738	61%	170,425	59%	32,313	77%
Use in Last 3 Days						
No	147,644	45%	128,413	44%	19,231	46%
Yes	184,025	55%	161,382	56%	22,643	54%

In the full sample, a total of 529,311 individuals (73%) were identified as having used opioids during their LTC stay. Seventy-nine percent (79%) of these individuals were opioid-naïve (no opioid use in the 45 days) prior to admission and 21% were not naïve. Among those who were naïve and not naïve in the full sample, 70% utilized opioids in the first three days, a rate that was

lower (66%) among those who were opioid-naïve prior to LTC admission relative to those who were not (84%).

Among the discharged sample, a total of 197,642 individuals (73%) used opioids during their LTC stay, 65% of whom had been opioid-naïve prior to their admission compared to 35% who had been opioid non-naïve. Eight-five percent (85%) of this full group (naïve and non-naïve) used opioids in the first three days of the LTC stay, and 31% had opioid use in the last three days before LTC discharge. A smaller percentage of those who had been naïve prior to admission used opioids in the first three days compared to those who were not naïve (82% vs. 88%); a much higher percentage of those who were not-naïve had opioid use in the last three days of the LTC stay compared to those who were naïve (43% vs. 25%).

Among residents not discharged from LTC during the study period, 331,669 individuals (72%) had opioid use during their stay. Overall, in the first three days of the LTC stay 61% used opioids, and 55% used opioids at day 30 of the LTC stay. There was a large difference in opioid use between naïve and non-naïve residents in the first three days (59% vs. 77%, respectively) but this difference was smaller at day 30 of the LTC stay (56% vs. 54%, respectively).

Discharged Residents' Opioid Use During the First and Last Three Days of the LTC Stay

Exhibits 5A, 5B, and 5C focus on the discharge population only. These exhibits display the number and percent of discharged residents using/not-using opioids in the first and last three days of their LTC stay.

Highlights

- Around 90% of all discharged residents in our sample -- including those who were opioid-naïve and non-naïve, had opioid use at some point during their stay.

- Among the small portion of individuals with no opioid use in the first three days, most do not have opioid use in the days before their discharge.

- Even among discharged residents with opioid use at the beginning of their stay, most do not have opioid use at the very end of those stays. In fact, only 26% of our sample has opioid use in both the first and last three days of their LTC stay.

Exhibit 5A: Opioid Use During the First and Last 3 Days of the LTC Stay: Discharged Residents, by Naïve Status

First 3 Days/ Last 3 Days	All Discharged Residents		Naïve Prior to Admission		Not Naïve Prior to Admission	
	N	%	N	%	N	%
No Use/No Use	21,645	11%	16,854	13%	4,791	7%
No Use/Use	8,979	5%	5,854	5%	3,125	5%
Use/No Use	114,091	58%	79,536	62%	34,555	51%
Use/Use	52,927	26%	26,699	20%	26,228	37%

Exhibit 5B. Discharged Residents' Opioid Use During the First and Last 3 Days of the LTC Stay

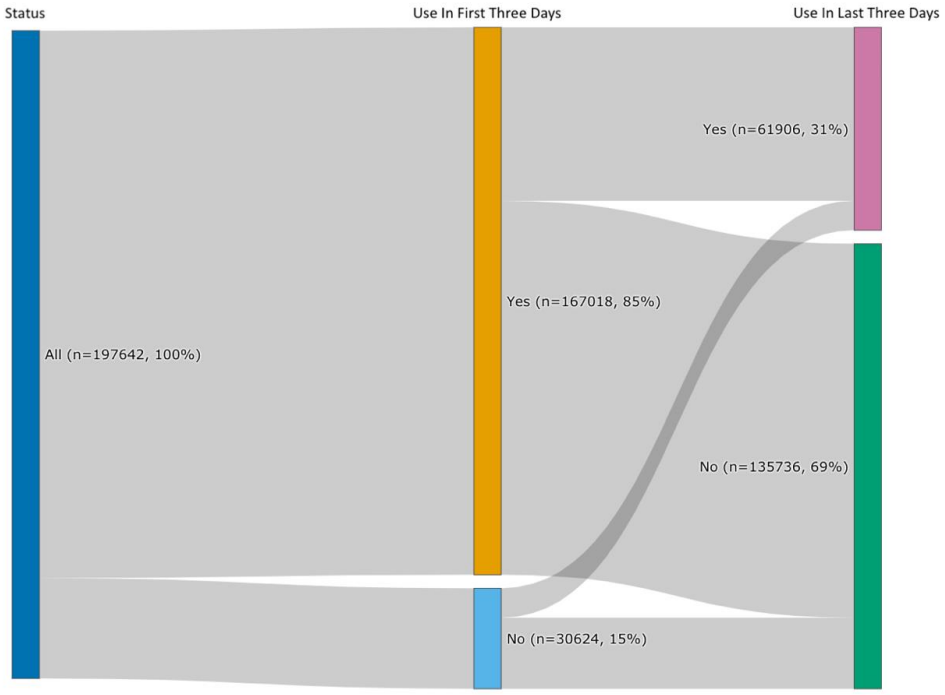
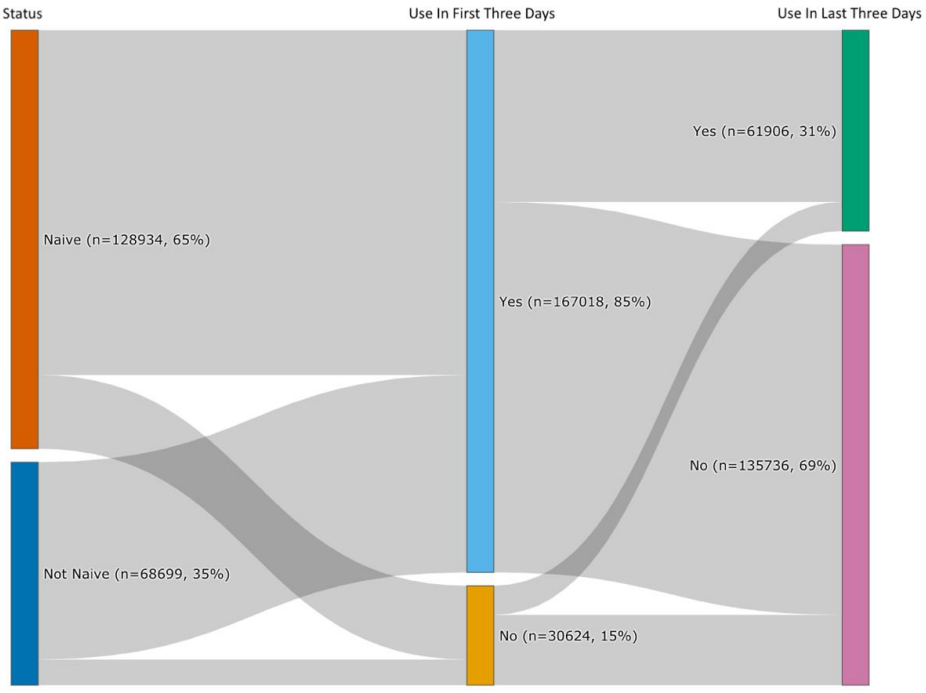


Exhibit 5C: Discharged Residents' Opioid Use During the First and Last 3 Days of the LTC Stay, by Naïve Status



Of all discharged residents in our sample, almost 90% of these individuals had opioid use at some point during the LTC stay. For naïve and non-naïve residents alike, opioid use during the first three days was especially prominent, with 82% and 88%, respectively, having opioid use during the first three days of the LTC stay. Individuals with no opioid use in the first three days rarely had opioid use at the end of their stay (i.e., only 5% of naïve and non-naïve residents went from having no opioid use in the first three days of the stay to having use at the time of discharge).

Among the vast majority of people with opioid use in the first three days of the LTC stay, naïve individuals were less likely to also have use in the last three days of the LTC stay relative to non-naïve individuals (25% and 43%, respectively). In addition, fewer naïve residents had opioid use during the first and last three days of their stay (20%), relative to non-naïve residents.

LTC Opioid and Benzodiazepines Use

Exhibit 6 shows benzodiazepine use during the first and last three days of the LTC stay overall and concurrently with opioids, among those with opioid use in the LTC stay.

Highlights

- A little more than one-third of all residents with LTC opioid use have benzodiazepine use at some point during the LTC stay, a number driven primarily by the high rate of use among non-discharged residents (42%) relative to discharged residents (19%).

- For our sample of opioid users, most residents with benzodiazepine use had concurrent use of a benzodiazepine and an opioid at some point during their stay (31%), a number again driven by the higher rate among non-discharged residents (38%) relative to discharged residents (18%).

- Among the full sample, 15% of residents had concurrent benzodiazepine and opioid use in the first three days of the LTC stay, a number that was somewhat higher for non-discharged residents (17%) relative to discharged residents (13%).

Exhibit 6. LTC Resident Opioids and Benzodiazepines Use						
	All LTC Residents		Discharged LTC Residents		Non-Discharged LTC Residents	
	N	%	N	%	N	%
Total People with LTC Opioid Use	529,311		197,642		331,669	
Benzodiazepine Use in LTC						
No	350,997	66%	160,239	81%	190,758	58%
Yes	178,314	34%	37,403	19%	140,911	42%
Concurrent LTC Opioid and Benzodiazepine Use						
No	367,499	69%	162,491	82%	205,008	62%
Yes	161,812	31%	35,151	18%	126,661	38%
Concurrent LTC Opioid and Benzodiazepine Use in First 3 Days						
No	447,342	85%	172,688	87%	274,654	83%
Yes	81,969	15%	24,954	13%	57,015	17%
Concurrent LTC Opioid and Benzodiazepine Use in Last 3 Days						
No	---	---	189009	96%	---	---
Yes	---	---	8633	4%	---	---

Of all those with LTC opioid use in our sample, whether discharged or not, 34% also used benzodiazepines at some point in their stay and 31% concurrently used benzodiazepines and opioids at some point during their stay. As raised above, of this population, 15% began concurrently using opioids and benzodiazepines in the first three days of their stay.

Among discharged residents with opioid use, 19% had benzodiazepine use at some point during the LTC stay, with almost all of these individuals (18%) having concurrent use. Thirteen percent (13%) of this population had concurrent use of benzodiazepines and opioids in the first three days of the LTC stay, but only 4% had such use in the last three days of the LTC stay.

Finally, 42% of non-discharged residents with opioid use had benzodiazepine use at some point during their stay. Again, most of these individuals (38%) had concurrent use of benzodiazepines and opioids at some point of their stay, and 17% had concurrent use in the first three days.

LTC Resident Opioids and Non-Benzodiazepine Z-Drug Use

Exhibit 7 presents information about the use of non-benzodiazepine "Z" drugs (zolpidem, eszopiclone, and zaleplon, which share properties with benzodiazepines and are typically used in the treatment of sleep disorders such as insomnia) in LTC among those with opioid use. Similar to above, the Exhibit presents the number and percent of residents who concurrently used opioids and Z-drugs as well as such use in the first and last three days of the LTC stay.

Highlights

- Among individuals with opioid use in the LTC setting, the use of Z-drugs was relatively low; a slightly higher percent of discharged residents, compared to non-discharged residents, used Z-drugs in the LTC stay (5% vs 3%).

- There was also a very low prevalence of any concurrent use of opioid medications and Z-drugs and concurrent opioid and Z-drug use in the first three days.

Exhibit 7. LTC Resident Opioid and Non-Benzodiazepine "Z-drug" Use						
	All LTC Residents		Discharged LTC Residents		Non-Discharged LTC Residents	
	N	%	N	%	N	%
Total with LTC Opioid Use	529,311		197,642		331,669	
Z-drug Use in LTC						
No	509,331	96%	188,417	95%	320,914	97%
Yes	19,980	4%	9,225	5%	10,755	3%
Concurrent LTC Opioid and Z-drug Use						
No	511,499	97%	188,986	96%	322,513	97%
Yes	17,812	3%	8,656	4%	9,156	3%
Concurrent LTC Opioid and Z-drug Use in First 3 Days						
No	519,260	98%	191,754	97%	327,506	99%
Yes	10,051	2%	5,888	3%	4,163	1%
Concurrent LTC Opioid and Z-drug Use in Last 3 Days						
No	---	---	195,017	99%	---	---
Yes	---	---	2,625	1%	---	---

Of all residents with LTC opioid use, 4% have Z-drug use as well, with overall concurrent use at 3% and concurrent use in the first three days at 2%. Among discharged residents with opioid use slightly higher percentages of the population utilized Z-drugs during their stay (5%), with 4% general concurrent use and 3% concurrent use in the first three days. Only 1% of this population concurrently used opioids and non-benzos in the last three days. 3% of non-discharged residents with LTC opioid used also use Z-drugs during their stay, and concurrently. Only 1% of this population had such concurrent usage in the first three days.

Post-LTC Opioid Use

Exhibits 8A, 8B, and 8C display post-LTC stay opioid use among those discharged from the LTC setting, stratified by overall opioid use and opioid use in the last three days in LTC among those who are discharged.

Highlights

- Among all discharged residents, 26% had an opioid prescription fill in the retail claims data during the seven days following discharge.

- Retail opioid use in the first seven days following discharge was especially high among residents with opioid use in the last three days of the LTC stay relative to those who did not have opioid use at the end of the LTC stay (47% vs. 20%).

Exhibit 8A. Retail Opioid Use Within 7 Days Post-LTC Stay						
	Discharge Sample		Opioid Retail Claim within 7 Days of Discharge			
	All		Yes		No	
	N	%	N	%	N	%
Total Discharge Sample	270,704	100%	70,470	26%	200,234	74%
LTC Opioid Use Status						
No	73,062	27%	5,673	8%	67,389	92%
Yes	197,642	73%	64,797	33%	132,845	67%
LTC Opioid Use in Last 3 Days Before Discharge						
No	208,798	77%	41,578	20%	167,220	80%
Yes	61,906	23%	28,892	47%	33,014	53%

Exhibit 8B. Retail Opioid Use Within 7 Days Post-LTC Discharge by Any LTC Opioid Use

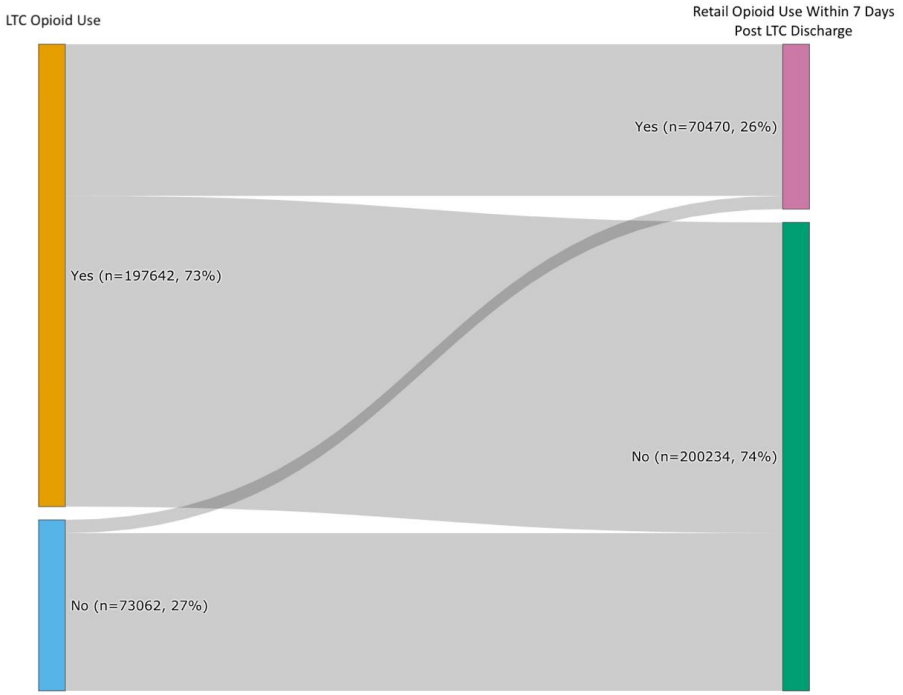
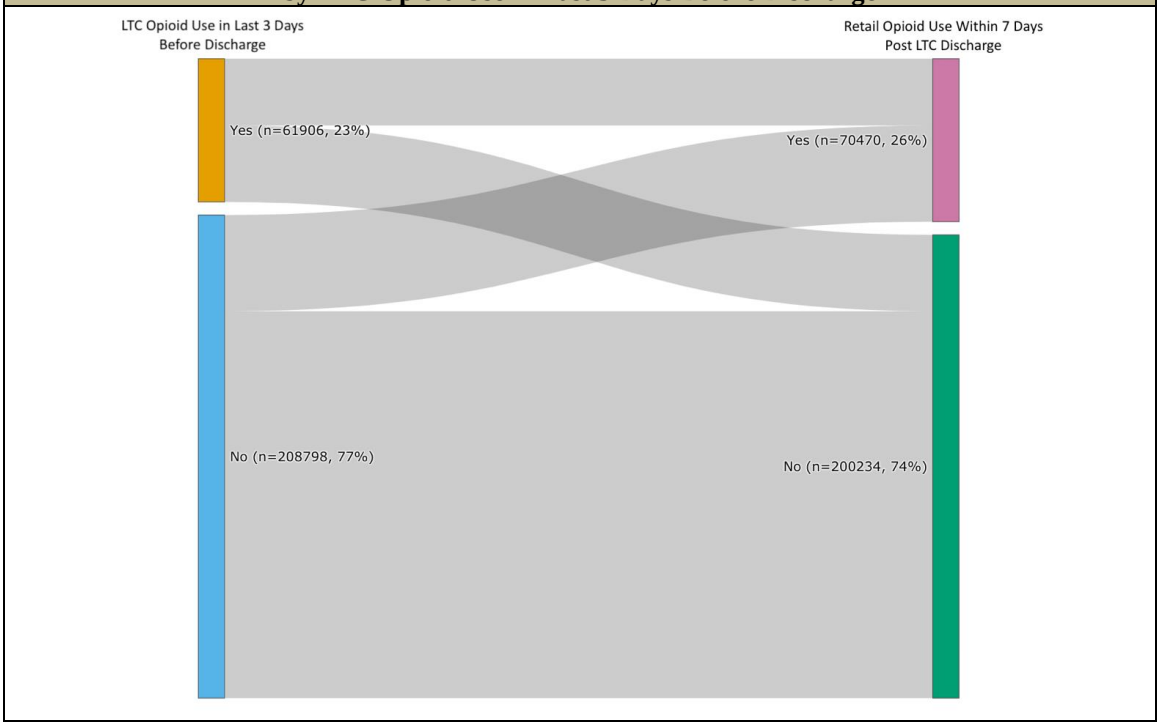


Exhibit 8C. Retail Opioid Use Within 7 Days Post-LTC Discharge by LTC Opioid Use in Last 3 Days Before Discharge



The majority of discharged residents in our sample used opioids at some point during their LTC stay (73%) but only a small percentage still have such use in the last three days before being discharged (23%).

Of those discharged who did not use opioids during their LTC stay (n=73062), 8% were identified as having used opioids in the seven days post-LTC discharge while the majority (92%) did not. Of those who did use opioids in the LTC setting (n=197,642), 33% had opioid use within seven days post-discharge while 67% did not.

The proportion with retail opioid claims in the first seven days following LTC discharge was considerably higher among residents who had opioid use in the last three days of the LTC stay. Among these residents (n=61906), 47% had continued opioid use based on retail claims from the first seven days following LTC discharge. In contrast, only 20% of discharged residents without opioid claims in the last three days of the LTC stay (n=208798) had retail opioid claims in the first seven days following LTC discharge.

Characteristics of Discharged Residents and Long-Term Opioid Use at 90 and 180 Days Post-LTC Discharge

Exhibits 9A, 9B, and 9C present the characteristics of discharged residents with long-term opioid use, defined as receiving at least a 30-day supply of opioids within 90 days of LTC discharge and at least a 90-day supply of opioids within 180 days of LTC discharge. We also looked to see if these residents had any OUD medication use during these timeframes. In addition, we analyzed

these longer-term opioid trajectories among all discharged residents and among those with opioid use during the last three days before LTC discharge and during the first seven days post-LTC discharge.

Highlights

- Among the discharged residents who had only retail claims for a period of 90 days following LTC discharge (and, thus, were presumably not readmitted to the LTC setting during that time period), 22% had at least 30 days supply of opioids during this timeframe. Only 1% of this group had any OUD medication claims during this timeframe.

- Among the discharged residents who had only retail claims for a period of 180 days following LTC discharge, 16% had at least 90 days supply of opioids during this timeframe. Only 1% of this group had any OUD medication claims during this timeframe.

- Among those who had longer-term opioid use following LTC discharge, almost half had opioid use in the last three days of the LTC stay, and slightly more than half had retail opioid use during the first seven days following discharge.

Exhibit 9A. Discharged Resident Characteristics and Opioid Use at Days 90 and 180 Post-Discharge				
	90 Days Post-Discharge		**180 Days Post-Discharge**	
	N	**%**	**N**	**%**
Residents with Retail Claims Only through Day 90 and 180	228,192		177,876	
Residents with 30+ Days Supply of Opioids (at Day 90) and 90+ Days Supply of Opioids (at Day 180)				
No	178,017	78%	149,939	84%
Yes	50,175	22%	27,937	16%
At Least 1 OUD Medication Prescription				
No	226,654	99%	176,387	99%
Yes	1,538	1%	1,489	1%
Discharged LTC Residents with 30+ and 90+ Days Supply of Opioids at 90 and 180 Days Post-Discharge				
	30+ Days Supply of Opioids at 90 Days		**90+ Days Supply of Opioids at 180 Days**	
	N	**%**	**N**	**%**
Total Number with Supply of Opioids	50,175		27,937	
Age				
65-69	11,371	23%	6,699	24%
70-74	11,464	23%	6,654	24%
75-79	10,740	21%	5,984	21%
80-84	5,487	11%	2,890	10%
85+	11,113	22%	5,710	20%
Sex				
Female	35,738	71%	19,944	71%
Male	14,437	29%	7,993	29%
Region				
Northeast	8792	18%	4613	17%
Midwest	12018	24%	6577	24%
South	19219	38%	10990	39%
West	10146	20%	5757	21%

Exhibit 9A (*continued*)				
	30+ Days Supply of Opioids at 90 Days		90+ Days Supply of Opioids at 180 Days	
	N	%	N	%
LTC Opioid Use				
No	4,305	9%	2,253	8%
Yes	45,870	91%	25,684	92%
LTC Opioid Use in First 3 Days				
No	9,926	20%	4,917	18%
Yes	40,249	80%	23,020	82%
LTC Opioid Use in Last 3 Days				
No	27,508	55%	14,196	51%
Yes	22,667	45%	13,741	49%
Retail Opioid Use in First 7 Days Post-Discharge				
No	22,597	45%	12,232	44%
Yes	27,578	55%	15,705	56%

Exhibit 9B. 30+ Day Supply of Opioids by Retail Opioid Claims in First 7 Days Post-Discharge and Opioid Use in Last 3 Days of LTC Stay

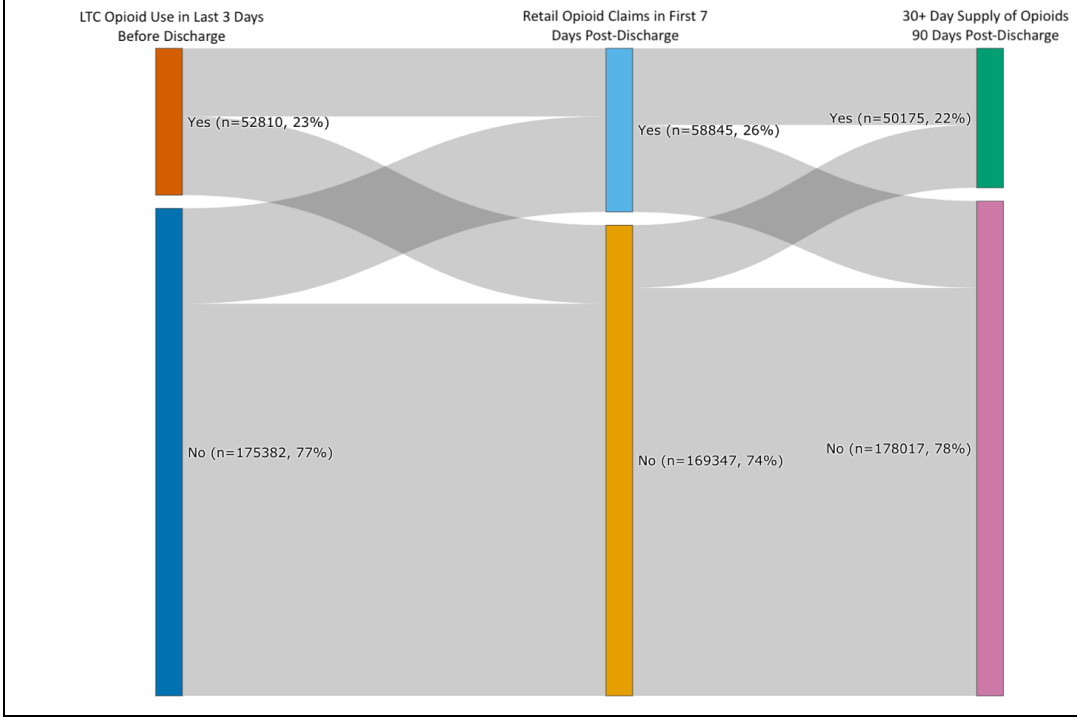
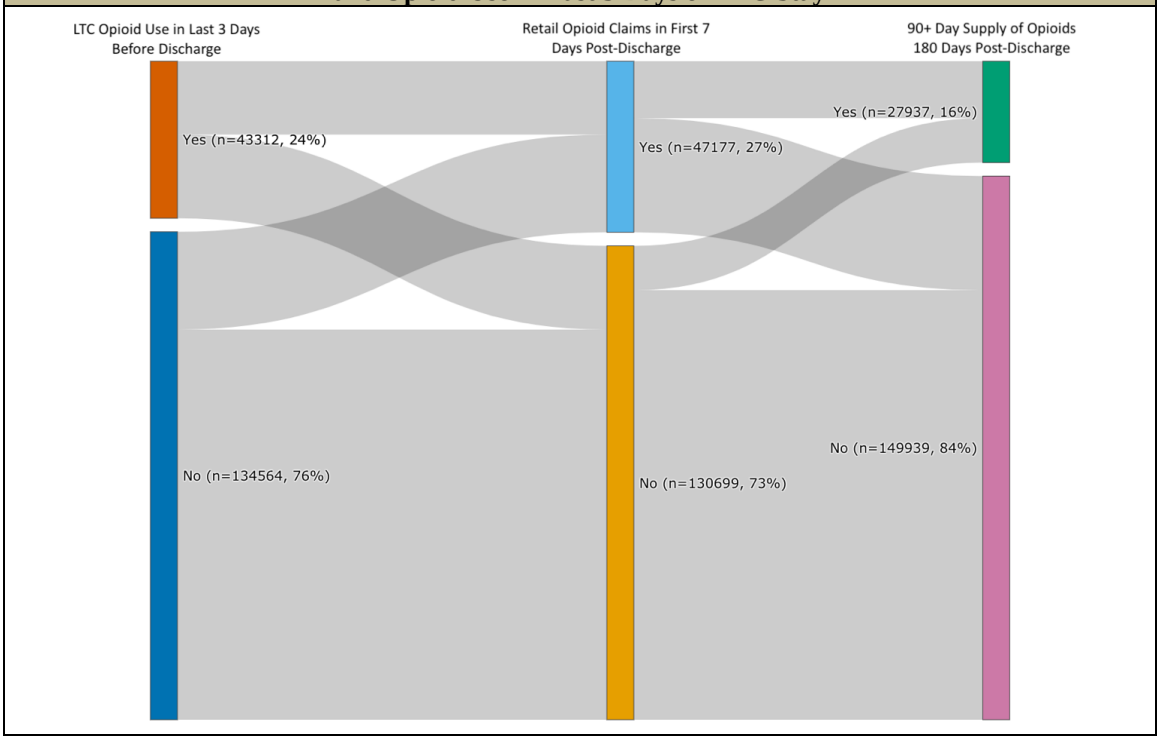


Exhibit 9C. 90+ Day Supply of Opioids by Retail Opioid Claims in First 7 Days Post-Discharge and Opioid Use in Last 3 Days of LTC Stay



We identified longer-term opioid use following LTC discharge by analyzing retail claims among discharged residents for periods of 90 and 180 days following discharge, looking for at least 30 days supply and 90 days supply of opioid medications over these two time periods, respectively. These analyses were limited to individuals who had retail claims only over this entire time period -- 228,192 residents over the 90-day time period and 177,976 residents over the 180-day time period. Among those with retail claims only at day 90, 22% had at least 30 days supply of opioids; among those with retail claims only at day 180, 16% had at least 90 days supply of opioids. At both 90 and 180 days post-LTC discharge, only 1% of individuals had retail claims for OUD medication.

The distribution of demographic traits for discharged residents receiving a 30+ day supply of opioids over 90 days and a 90+ day supply of opioids over 180 days was quite similar in terms of age, sex, and region (this is not surprising, as these populations overlap considerably). Among those who had longer-term opioid use following LTC discharge: almost all had LTC opioid use; around 80% had opioid use in the first three days of the LTC stay; around half had opioid use in the last three days of the LTC stay; and slightly more than half had retail opioid use during the first seven days following discharge. These proportions were very similar among those with long-term opioid use as assessed at day 90 and at day 180.

Exhibits 9B and 9C show the breakdown of opioid use from the last three days of the LTC stay, to the first seven days following LTC discharge, to longer-term opioid use outcomes at 90 and 180 days, respectively. Building on Exhibits 8B and 8C, these figures are especially useful to see the breakdown of opioid use in the first seven days post-LTC discharge by day 90 and 180 post-LTC discharge. Among all discharged residents who had opioid use during the first seven

days following LTC discharge, 47% went on to have at least 30 days supply of opioids over the 90 days following that discharge. This percentage was 13% among those who did not have opioid use during the first seven days following LTC discharge. Among those who had opioid use during the first seven days following LTC discharge, 33% went on to have at least 90 days supply of opioids over the 180 days following that discharge. This percentage was 9% among those who did not have opioid use during the first seven days following LTC discharge.

CONCLUSION

Using data from IQVIA, we tracked the use of pain medications for individuals with pharmacy claims across the retail and LTC pharmacy sectors. IQVIA data cover a large portion of these pharmacy markets nationally and include prescription drug claims across payers, including medications covered through Medicare's bundled SNF payments. Our study findings are based on a sample of individuals aged 65 and above who were admitted to LTC (a category that includes nursing homes (SNFs and NFs) and assisted living facilities) between July 1, 2018, and June 30, 2019, and had prescriptions for either opioid or non-opioid pain medications in the LTC setting.

Around three-quarters of our study sample had at least one opioid prescription during their initial LTC stay, a proportion that was higher than the share of residents taking non-opioid pain medications, including basic analgesics (half of our study population had at least one prescription for non-opioid pain medications). The vast majority (83%) of our sample was opioid "naïve" before their LTC admission, meaning they did not have any opioid prescription claims in the 45 days prior to admission. However, this proportion differed considerably depending on whether individuals remained in the LTC setting during our study period or were discharged back to the community, presumably following a post-acute SNF stay. Twenty-nine percent (29%) of discharged residents had opioid use in the 45 days prior to LTC admission, compared to only 10% of residents who remained in the LTC facility. This difference could reflect conditions that more typically result in post-acute SNF stays (as opposed to LTC stays), such as major joint replacement surgeries and other procedures that may be precipitated by pain that is difficult to manage.

Regardless of their pre-LTC opioid use, more than 80% of discharged residents had opioid use during their first three days in the LTC setting. By the last three days of the LTC stay, most discharged individuals were no longer taking opioids, although these rates differed by pre-LTC use status, with 43% and 25% of those with and without prior opioid use, respectively, having such use in the last three days before LTC discharge.

This pattern was different for residents who were not discharged and remained in the facility. Opioid use in the first three days of the LTC stay differed to a greater extent based on prior opioid use -- 77% for those with prior opioid use and 59% for those without prior opioid use. By day 30 of the LTC stay, these differences had lessened and even reversed slightly -- with 54% and 56% of those with and without prior opioid use having opioid use on day 30 of the LTC stay.

Among individuals with LTC opioid use, around one-third (34%) had benzodiazepine use at some point during their LTC stay, a proportion that was even higher (42%) among non-discharged LTC residents who generally had longer lengths of stay. Almost all residents with benzodiazepine use in our sample had concurrent use of an opioid and a benzodiazepine during their LTC stay (31% overall or 90% of all LTC residents with benzodiazepine use), despite the 2016 CDC guideline to avoid concurrent prescribing of these two types of medications. More specifically, the combination of these two drugs can be clinically problematic because of the

overlapping sedating effect on respiration and cognitive function.[21,26] The use of Z-drugs, which share similar properties of benzodiazepines,[22] was much less common (4% overall), although most who used these medications also had concurrent use of Z-drugs and opioids.

Focusing on the post-LTC period, about one-fourth of all discharged individuals (26%) had a retail claim for an opioid within seven days of their LTC discharge. Among those with opioid claims during the last three days of the LTC stay, around half (47%) had a retail opioid claim in the first seven days following discharge, a proportion that was only 20% for those without opioid use during the last three days of the LTC stay. Importantly, a sizeable minority of discharged individuals had longer-term or chronic opioid use. Among those who had retail claims only during the 180 days following LTC discharge, 16% had at least 90 days supply of opioids during their first 180 days in the community.

In sum, opioid use was very common among the LTC residents who used pain medications in our sample, and opioid use trends differed considerably across the discharged and non-discharged residents. Perhaps reflecting their post-acute rehabilitative needs, discharged residents were more likely to have opioid use prior to LTC admission and at the beginning of the LTC stay. Although this opioid use generally diminished over the course of the LTC stay, a sizeable minority of these individuals had opioid use once discharged to the community, some of which developed into longer-term or chronic use. Roughly one-in-five discharged residents in our sample had concurrent opioid and benzodiazepine use during their LTC stay. The non-discharged individuals in our sample generally had lower opioid use prior to LTC admission and at the beginning of the LTC stay, relative to discharged residents. Over the course of their LTC stay, however, opioid use of non-discharged residents dropped only modestly, sometimes with problematic benzodiazepine use added to the medication use over the LTC stay. A few areas of interest for future research are to better understand the reason for such a high proportion of residents using opioids during their first three days in the LTC setting and using benzodiazepine concurrent with opioids during their stay.

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APPENDIX A: BREAKDOWN OF TEN PAIN MEDICATIONS PRESCRIBED

Exhibit A1. Top 10 Pain Medications Prescribed Pre-LTC and Post-LTC Stay in Discharged Sample			
Duration Status	**Market Name**	**N**	**%**
Pre-LTC			
Short-Acting	HYDROCODONE/ACETAMINOPHEN	271,779	34.1%
Short-Acting	TRAMADOL HCL	174,689	21.9%
Short-Acting	OXYCODONE/ACETAMINOPHEN	109,292	13.7%
Short-Acting	OXYCODONE HYDROCHLORIDE	72,409	9.1%
Short-Acting	ACETAMINOPHEN/CODEIN	38,406	4.8%
Long-Acting	MORPHINE SULFATE ER	27,385	3.4%
Long-Acting	FENTANYL	25,920	3.3%
Long-Acting	OXYCONTIN	13,362	1.7%
Short-Acting	HYDROMORPHONE HCL	11,151	1.4%
Short-Acting	MORPHINE SULFATE	8,936	1.1%
During LTC			
Short-Acting	HYDROCODONE/ACETAMINOPHEN	178,297	29.7%
Short-Acting	TRAMADOL HCL	121,964	20.3%
Short-Acting	OXYCODONE HYDROCHLORIDE	121,417	20.2%
Short-Acting	OXYCODONE/ACETAMINOPHEN	85,956	14.3%
Short-Acting	ACETAMINOPHEN/CODEIN	13,896	2.3%
Short-Acting	HYDROMORPHONE HCL	13,534	2.3%
Long-Acting	FENTANYL	13,061	2.2%
Long-Acting	MORPHINE SULFATE ER	11,761	2.0%
Short-Acting	MORPHINE SULFATE	10,608	1.8%
Long-Acting	OXYCONTIN	8,365	1.4%
Post-LTC			
Short-Acting	HYDROCODONE/ACETAMINOPHEN	207,434	30.6%
Short-Acting	TRAMADOL HCL	154,387	22.8%
Short-Acting	OXYCODONE/ACETAMINOPHEN	90,765	13.4%
Short-Acting	OXYCODONE HYDROCHLORIDE	77,413	11.4%
Short-Acting	ACETAMINOPHEN/CODEIN	28,735	4.2%
Long-Acting	FENTANYL	21,625	3.2%
Long-Acting	MORPHINE SULFATE ER	21,138	3.1%
Short-Acting	MORPHINE SULFATE	19,614	2.9%
Short-Acting	HYDROMORPHONE HCL	11,118	1.6%
Long-Acting	OXYCONTIN	9,362	1.4%

Exhibit A2. Top 10 Pain Medications Prescribed Pre-LTC Stay in Non-Discharged Sample			
Duration Status	**Market Name**	**N**	**%**
Pre-LTC			
Short-Acting	HYDROCODONE/ACETAMINOPHEN	152,080	32.7%
Short-Acting	TRAMADOL HCL	105,007	22.6%
Short-Acting	OXYCODONE/ACETAMINOPHEN	53,161	11.4%
Short-Acting	OXYCODONE HYDROCHLORIDE	44,660	9.6%
Short-Acting	ACETAMINOPHEN/CODEIN	21,967	4.7%
Long-Acting	FENTANYL	21,112	4.5%
Long-Acting	MORPHINE SULFATE ER	17,896	3.9%
Short-Acting	MORPHINE SULFATE	10,780	2.3%
Long-Acting	OXYCONTIN	7,896	1.7%
Short-Acting	HYDROMORPHONE HCL	7,288	1.6%
During LTC			
Short-Acting	HYDROCODONE/ACETAMINOPHEN	403,788	24.8%
Short-Acting	TRAMADOL HCL	362,142	22.3%
Short-Acting	OXYCODONE/ACETAMINOPHEN	212,385	13.1%
Short-Acting	MORPHINE SULFATE	182,295	11.2%
Short-Acting	OXYCODONE/ACETAMINOPHEN	139,078	8.6%
Long-Acting	FENTANYL	87,900	5.4%
Long-Acting	MORPHINE SULFATE ER	53,174	3.3%
Short-Acting	ACETAMINOPHEN/CODEIN	39,376	2.4%
Short-Acting	HYDROMORPHONE HCL	36,341	2.2%
Long-Acting	METHADONE HCL	27,169	1.7%