Increase in GHB Prescriptions and Their Cost for CHIP/Medicaid and Medicare Part D Patients

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Abstract

Background: The purpose of this study was to describe the temporal pattern of gamma-hydroxybutyrate (GHB) distribution and cost nationally and between states for CHIP/Medicaid and Medicare Part D patients.

Methods: GHB prescriptions were extracted by brand name, from the State Utilization Data Tool from medicaid.gov and the Medicare part D Prescribers by Provider and Drug Dataset from cms.gov. GHB prescriptions were separated by state, corrected for population, and analyzed. States outside a 95% confidence interval were considered statistically significant. GHB cost analyses were performed between 2017 and 2020. GHB prescribers were observed for Medicare Part D enrollees in 2019.

Results: There was a steady increase in the cost of GHB prescriptions with an overall 40% cost increase from 2017 to 2020 for CHIP/Medicaid enrollees. Maryland prescribed four-fold more GHB than the next-highest state. Specialists other than somnologists were found to prescribe the highest number of GHB prescriptions to Medicare Part D enrollees.

Conclusion: A significant difference in the number of GHB prescriptions per state and per person was observed. Further research is necessary to understand how the COVID-19 pandemic may have affected these findings including the origins of the pronounced state-level disparities.

Introduction

Gamma-hydroxybutyrate (GHB) is the sodium salt of gamma-hydroxybutyric acid, a naturally occurring neurotransmitter in the brain (1). GHB (Xyrem) is FDA-approved for excessive daytime sleepiness due to narcolepsy and cataplexy, which denotes a sudden loss of muscle tone while awake (2). Despite GHB's use for daytime sleepiness (3), it is known to be prescribed off label for alcohol withdrawal along with maintaining abstinence of cravings for alcohol for approximately 9–12 months (4). Due to the potential risk of misuse, the Xyrem U.S. Risk Evaluation and Mitigation Program was put in place. This program incorporates strict guidelines including, prescriber and patient enrollment, education, and documentation, monitoring drug usage and dispensing, and pharmacists' certification on the drug (5).

There was a 23.6–29.1% increase in recreational GHB/gamma butyrolactone drug consumption during the COVID-19 pandemic (6). GHB users had the highest increase in drug usage (6). These observations were due to GHB being one of the least expensive and easiest to obtain despite pandemic shutdowns (6). This investigation examined the change in usage of GHB among Medicaid and Medicare patients to provide insight as to what GHB is being prescribed for and who is prescribing the drug. We also examined state level differences in prescribing which was previously completed for other drugs (7–9). Therefore, we believe our study will help support that there was an increase in prescribed number of GHB to CHIP/Medicaid patients and Medicare patients during 2017–2019 and after 2020. It was also hypothesized that there was an overall increase in cost during this time as well.

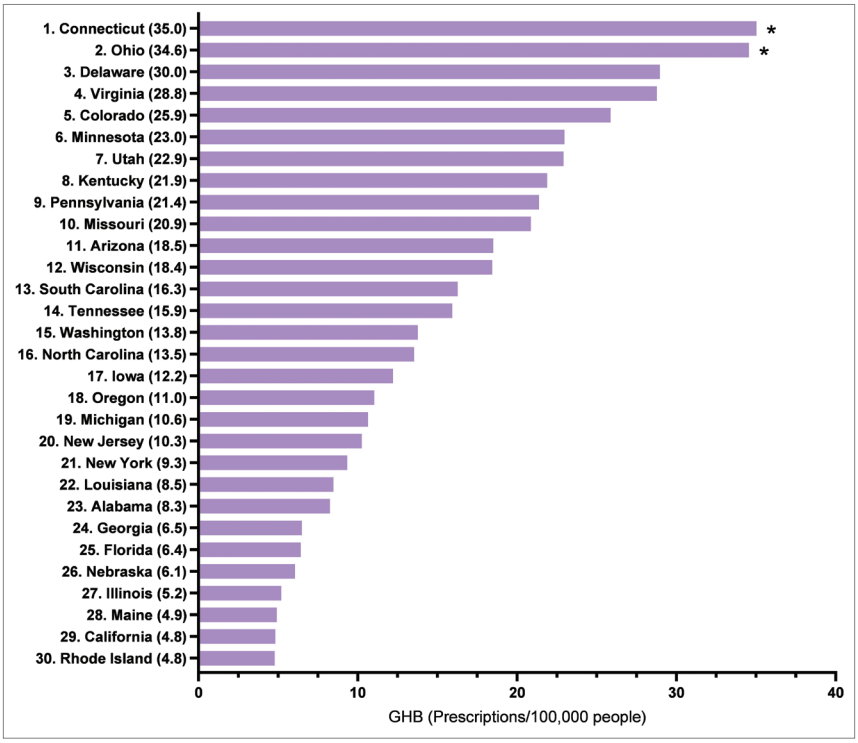

Figure 1. GHB prescriptions per Medicaid enrollee in 2019 year. Twenty states not displayed due to no (<11) prescriptions: AK, AR, HI, ID, IN, KS, MA, MD, MS, MT, ND, NH, NM, NV, OK, SD, TX, VT, WV, and WY. *p < .05 vs state mean.

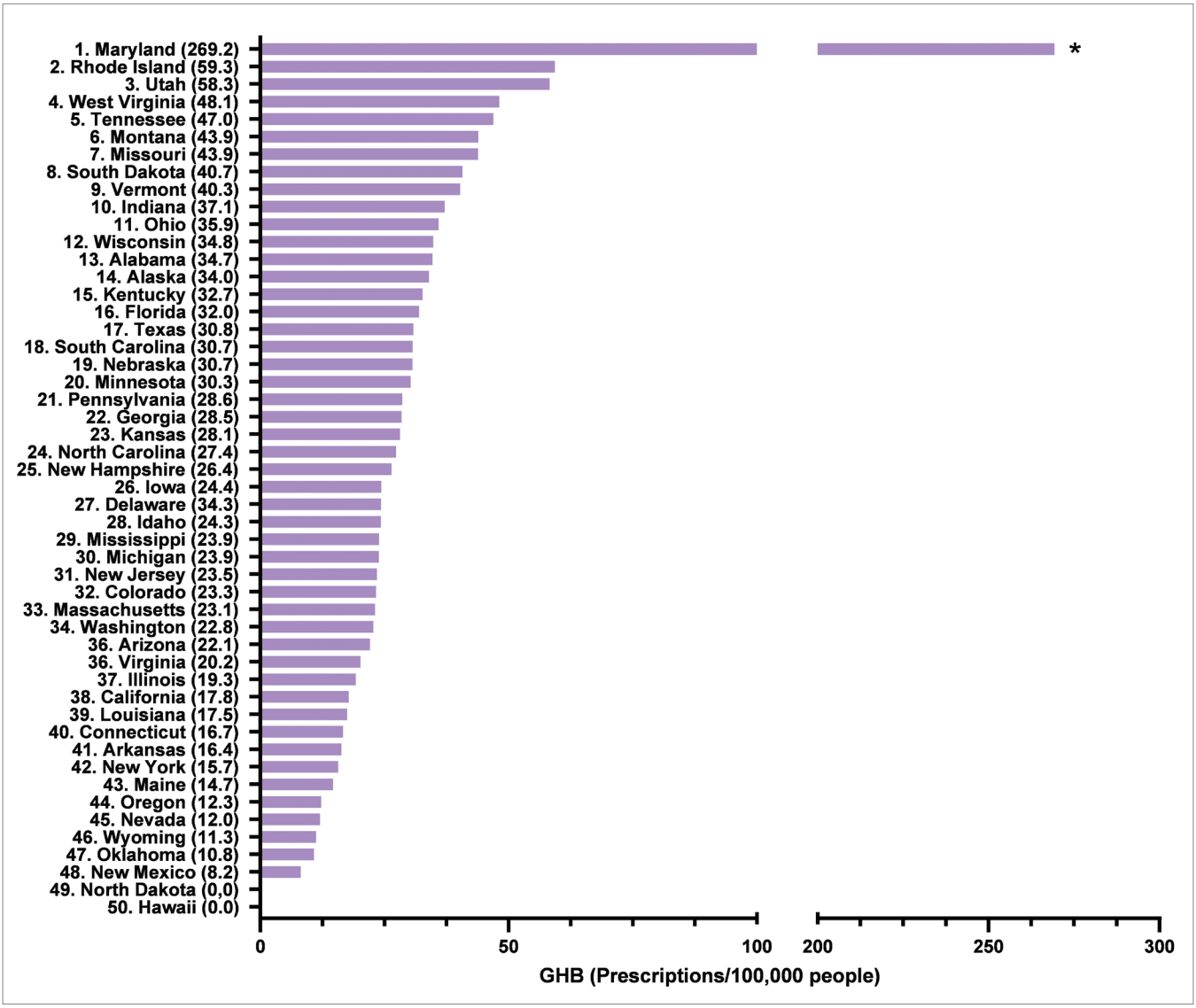

Figure 2. GHB prescriptions per Medicare Part D Enrollee in 2019 (*p < .05 versus state mean).

Methods

Databases

Data was extracted from the Medicaid State Utilization and the Medicare Part D Prescribers and Drug claims databases. Medicaid.gov provided breakdowns of the amount and cost of drugs being prescribed to Children's Health Insurance Program (CHIP)/Medicaid enrollees (10). The drug breakdowns were also able to be extracted for each state within the U.S. (10). Additional information provided by medicaid.gov included total cost analysis of the overall Medicaid spending budget (10). Data.cms.gov provided the same breakdown of the amount and cost of drugs being prescribed to the Medicare Part D enrollees (11). The Medicare prescription database provided the total number of drugs being prescribed during 2019 (the most recent year when the analyses were completed) and what type of medical provider was prescribing the drug (12). Data from the District of Columbia was incorporated into the Maryland data to keep both databases consistent. Procedures were approved by the IRB of Geisinger.

Procedures

Medicaid.gov provided the following variables: number of GHB prescriptions per year, number of prescriptions per state, cost of GHB prescriptions each year, and the total amount of Medicaid spending allocated to GHB prescriptions each year. In-depth cost analysis of GHB prescriptions for CHIP/Medicaid was compared between the entirety of each year from 2017 through 2020.

Data.cms.gov provided the following variables: number of GHB prescriptions per year, number of GHB prescriptions per state, and type of GHB prescription prescriber. GHB CHIP/Medicaid and Medicare Part D prescriber data was obtained for 2019. The number of prescriptions/enrollee/state of GHB prescriptions were analyzed and corrected based on the number of CHIP/Medicaid or Medicare Part D enrollees.

The data collected for CHIP/Medicaid and Medicare Part D programs were from 2019. Data for CHIP/Medicaid and Medicare Part D were suppressed from states who reported less than 11 GHB prescriptions per quarter as per the CMS

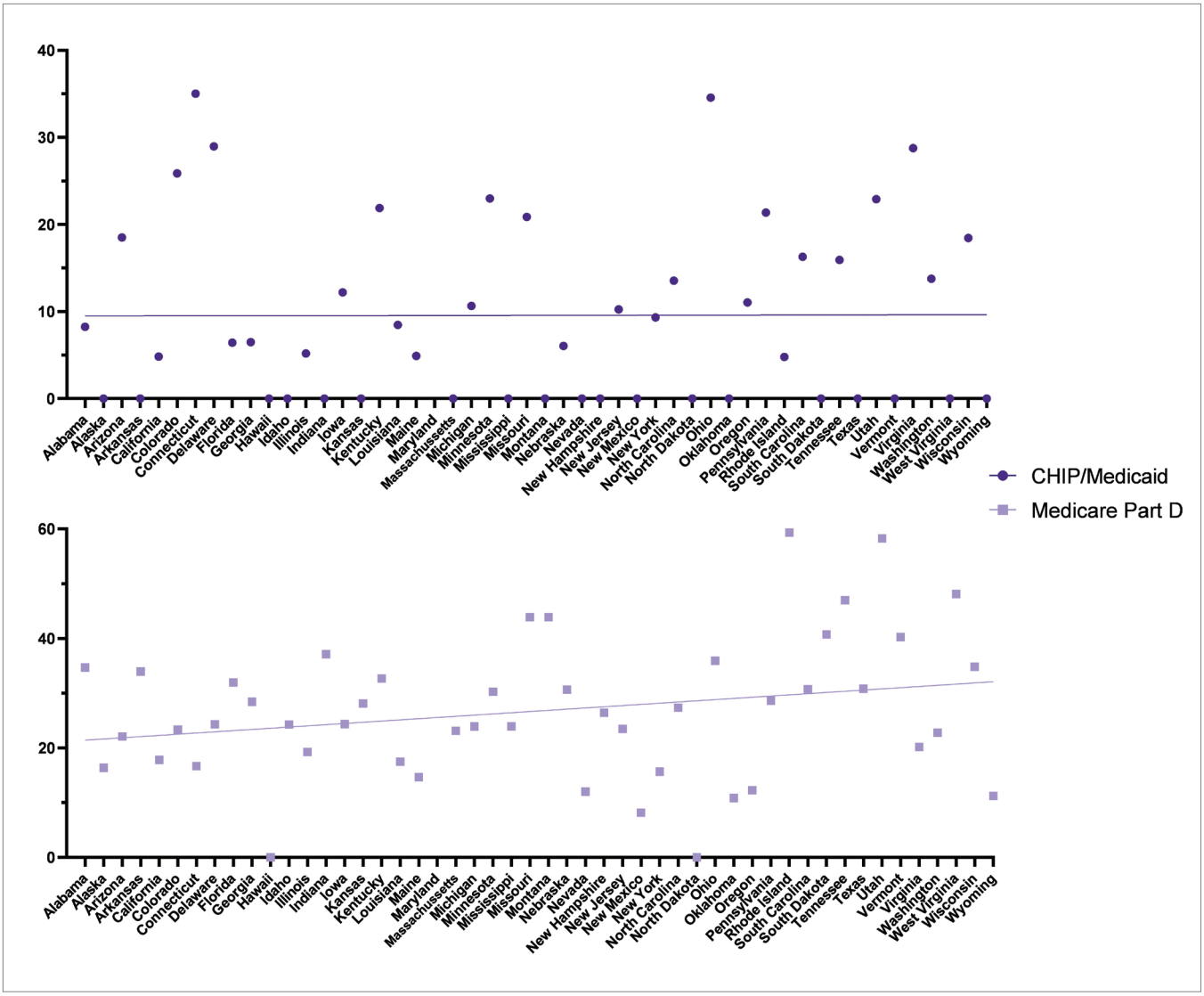

Figure 3. Scatterplot comparing GHB prescriptions per 100,000 patients between CHIP/Medicaid and Medicare Part D enrollees.

confidentiality policy, and therefore omitted from figures. GHB usage, central tendencies, and total number of GHB prescriptions among CHIP/Medicaid and Medicare Part D enrollees were examined.

Data Analysis

All analyzed data was examined through tables, bar graphs, and heatmaps constructed from Microsoft® Excel version 2022 for Windows, GraphPad Prism, and JMP statistical software. The data was analyzed based on calculated standard deviation values. A significance value of α=.05 was used to determine significance of data. Statistically significant states were identified as states with prescribing rates that fell outside the 95% confidence interval (beyond 1.96 standard deviations). Percent differences in cost of GHB prescriptions across the years 2017–2018, 2018–2019, and 2019–2020 were reported. States with GHB data suppressed due to low prescribing were counted as a "0" for analyses.

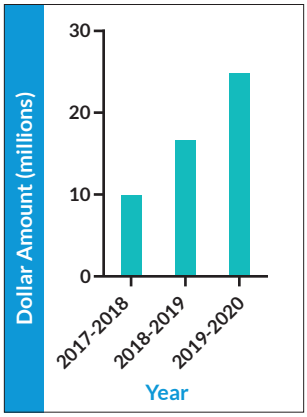

Figure 4. The total change in GHB prescription cost for Medicaid enrollees across a four-year period (2017–2018, 2018–2019, 2019–2020).

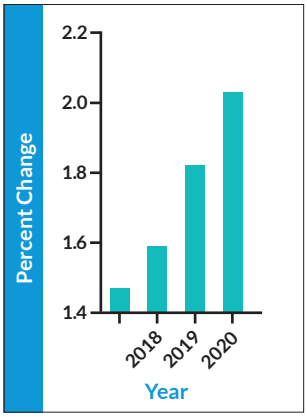

Figure 5. The percent calculated of total Medicaid spending dedicated to GHB prescriptions across the pre-pandemic (2017–2019) and pandemic years (2020).

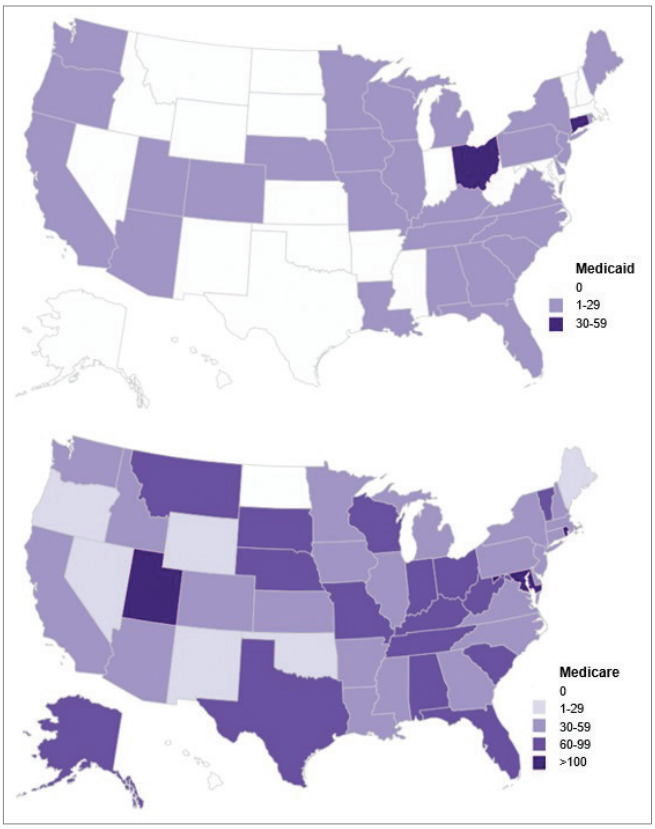

Figure 6. Heat maps of the US visualizing the comparison in density of GHB prescriptions distributed across each state per 100,000 patients enrolled in Medicaid and Medicare in 2019.

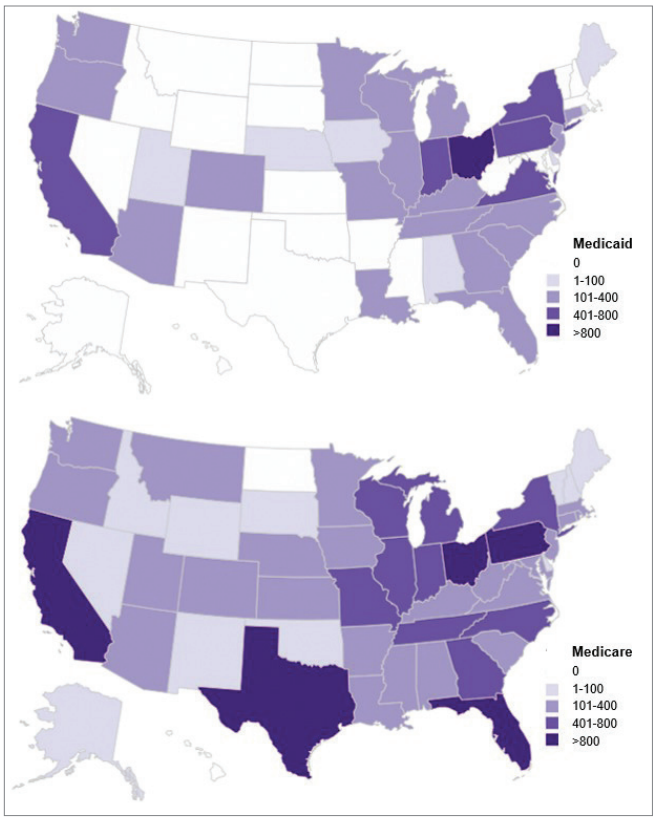

Figure 7. Heat maps of the U.S. visualizing the comparison in density of total number of GHB prescriptions per state between CHIP/Medicaid and Medicare Part D. The total number of GHB prescriptions were distributed during the 2019 year.

Results

The highest prescription rate was in the state of CT with OH falling short by only a few GHB prescriptions for CHIP/Medicaid (Figure 1). Both states (OH and CT) were also found to be above one standard deviation for the CHIP/Medicaid program (Figure 1). The highest prescription density for Medicare Part D was MD (Figure 2). Maryland as an outlier was also the only state above one standard deviation for Medicare Part D. Figure 3 provides a visual representation for prescription density per 100,000 patients between CHIP/Medicaid and Medicare Part D programs via scatterplot. Data for CHIP/Medicaid and Medicare Part D were suppressed from states who reported less than 11 GHB prescriptions per quarter as per the CMS confidentiality policy. The number of GHB prescriptions fluctuated in years prior to and during the pandemic.

Table 2 arranged the total number of GHB prescriber types for Medicare Part D enrollees based on GHB prescriptions for 2019. Providers included family practice, non-doctor, other specialties, and sleep medicine, respectively. Among the highest grand total of prescribers, the highest prescriber types came from "other specialties" in FL (1,481 prescribers), TX (1,072 prescribers), and CA (919 prescribers) (Table 2). These numbers could be correlated to the higher populations found in these states. The lowest grand total of prescribers was denoted to the following states: AR (36 prescribers), WY (13 prescribers), ME (52 prescribers). Prescribers in family practice had the lowest total number of GHB prescriptions prescribed, with OH (11 prescribers) GA/MI/MO/NC/RI (12 prescribers), and VT (13 prescribers) having the least amount of GHB prescribers. Figure 5 provides the visual representation of the data highlighted in Table 2. All GHB prescribers make up a total of 0.02% of all Medicare Part D prescribers within the U.S. (12).

Figure 4 shows the total difference in GHB prescription cost across each year from 2017 to 2020. Both Figures 3 and 4 show a steady increase between each year listed. Figure 5 represents the percent change of Medicaid spending of GHB prescriptions as it relates to each year starting from 2017 through 2020. Figure 6 heatmaps show the density of GHB prescriptions distributed across each state per 100,000 patients who were enrolled in CHIP/Medicaid and Medicare Part D in the year of 2019. Figure 7 heatmaps show a comparison in density of the total number of GHB prescriptions per state between CHIP/Medicaid and Medicare Part D in 2019.

Discussion

The hypothesis was that the use of GHB as a medication approved for narcolepsy would increase each year between 2017 and 2020. It was also projected that costs would rise overall during this time. This analysis supports the hypothesis that there was an increase in the use and prescription of GHB.

The total spending on GHB prescriptions by CHIP/Medicaid increased as well (Figure 4). Between 2017 and 2019, there

Total Number of GHB Prescriptions 2019			
States	Medicare Part D	CHIP/Medicaid	State Grand Total
AK	36	0	36
AL	380	76	456
AR	109	0	109
AZ	306	316	622
CA	1171	560	1731
CO	223	330	553
CT	119	298	417
DE	53	67	120
FL	1522	232	1754
GA	515	118	633
HI	0	0	0
IA	160	83	243
ID	85	0	85
IL	451	146	597
IN	491	0	491
KS	158	0	158
KY	318	282	600
LA	160	125	285
MA	322	0	322
MD	265	265	265
ME	52	13	65
MI	517	247	764
MN	324	240	564
MO	564	177	741
MS	151	0	151
MT	106	0	106
NC	568	240	808
ND	0	0	0
NE	111	15	126
NH	83	0	83
NJ	397	175	572
NM	36	0	36
NV	67	0	67
NY	596	560	1156
OH	882	902	1784
OK	84	0	84
OR	111	110	221
PA	820	628	1448
RI	137	14	151
SC	345	170	515
SD	75	0	75
TN	668	232	900
TX	1347	0	1347
UT	245	71	316
VA	319	407	726
VT	62	0	62
WA	325	238	563
WI	428	193	621
WV	221	0	221
WY	13	0	13
Grand Total	16498	7265	23763

Table 1. GHB prescriptions in Medicaid and Medicare in 2019.

Total Number of GHB Prescriptions 2019					
States	Prescriber Type				
	family practice	non-doctor	other specialty	Sleep Medicine	Grand Total
AK		24	12		36
AL	22		314	44	380
AR		34	75		109
AZ		12	254	40	306
CA	47	59	919	146	1171
CO	24		174	25	223
CT		20	99		119
DE			53		53
FL	41		1481		1522
GA	12		448	55	515
IA		12	126	22	160
ID		39	46		85
IL		12	439		451
IN		95	396		491
KS	19		139		158
KY	14		304		318
LA			160		160
MA			300	22	322
MD		51	203	11	265
ME		12	40		52
MI	12	155	262	88	517
MN		55	194	75	324
MO	12	14	351	187	564
MS			151		151
MT		26	65	15	106
NC	12	45	484	27	568
NE			96		96
NH			83		83
NJ	92		294	11	397
NM			36		36
NV		13	54		67
NY		63	509	24	596
OH	11	159	568	144	882
OK	24		48	12	84
OR			81	30	111
PA	37	48	723	12	820
RI	12		54	71	137
SC		111	234		345
SD			75		75
TN	32	89	531	16	668
TX	24	175	1072	76	1347
UT		34	101	110	245
VA		88	206	25	319
VT	13		49		62
WA		12	291	22	325
WI		51	352	25	428
WV			221		221
WY			13		13
Grand Total	460	1508	13180	1335	16483

Table 2. GHB prescriptions for all states was extracted from the Medicare Provider and Drug dataset on data.cms.gov. The total number of prescriptions for Medicare Part D enrollees were arranged based on the type of provider (family practice, advanced practice provider, other specialty, and sleep medicine). The bottom row depicts the total number of prescriptions given from each type of medical provider.

was an annual increase of 0.18 %, with a 0.21% increase during the pandemic year (Figure 5). These findings are consistent with prior data indicating that drug use increased during the pandemic (13).

This study also identified pronounced state-level differences. The Medicare Part D program provided an extensive amount of data when compared to the CHIP/Medicaid program. Only two states participating in Medicare Part D did not report the number of GHB prescriptions given out during the 2019 year, in comparison to the 19 states who did not report (i.e., values suppressed due to being < 11 can be treated as 0) for CHIP/Medicaid. If additional data was not suppressed for being a part of the "Preferred Drug List" for the CHIP/Medicaid program, more significant findings could have been observed given the difference in number of enrollees between both programs (62,010,391 Medicare Part D enrollees vs. 70,948,221 CHIP/Medicaid enrollees). More similarities in density of GHB prescription per 100,000 patients could have also been identified. Data not provided, however, did not meet the CMS confidentiality policy as mentioned earlier.

A notable finding from Table 2 was the fact that somnologists were the third-lowest GHB prescribers in Medicare Part D patients, with cardiologists ranking first. Rather than being used solely as a narcolepsy drug, GHB has been found to be used in cardiology as a long-term sedative without depression of cardio-circulatory or respiratory measures, kidney and other functions (14). The mean age for bypass patients undergoing heart surgery is 68.5 years (15), a demographic that correlates to Medicare Part D enrollees' outpatient prescription drug benefits program (16).

An important implication to consider for this study and future research is the issue of drug misuse. Despite this study covering GHB prescriptions that were prescribed by a medical provider, there is still concern about the prescriptions being inappropriately used by patients, as well as being inappropriately diverted to GHB drug misusers for non-medical purposes.

There are also several limitations to consider. These findings, while applicable for Medicaid and Medicare patients which account for over one-third of the U.S. population, further study among those with private insurance should be completed. As narcolepsy is an uncommon disorder (19–56/100,000 people), additional study with electronic medical records may be necessary to determine what percent of prescriptions were for off-label indications (17).

Conclusion

In conclusion, this study found a significant difference in the number of GHB prescriptions given to CHIP/Medicaid patients versus Medicare Part D patients during the 2019 year. Cost analysis concluded a steady rise in the total cost of both GHB prescriptions and CHIP/Medicaid program spending dedicated to GHB prescriptions prior to and during the pandemic years. Additional research could include analysis of the 2021 post-pandemic year to include differences in GHB prescriptions and costs in quarterly plots as restrictions began to be lifted. This research along with future related research could allow for greater insight into how the COVID-19 pandemic has impacted GHB drug usage among CHIP/Medicaid and Medicare Part B patients.

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Disclosures

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