The Association of Gabapentin Use and Dose With Substance Use Disorders Prior to Inpatient Mental Health Treatment:
A Cross-Sectional Study

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ABSTRACT

Objective: To investigate the relationship between gabapentin use and dose with substance use disorders (SUDs) prior to inpatient mental health treatment.

Methods: A cross-sectional study was performed in current gabapentin users admitted to inpatient psychiatry services from December 2015 through January 2017 in a large urban teaching hospital. The primary analysis examined rates and doses of gabapentin use in relation to SUD. A multinomial logistic regression was performed to assess a predictive model for SUD in gabapentin users. The secondary analysis examined trends of off-label gabapentin use.

Results: Of 1,483 admissions to inpatient psychiatry services, 345 subjects (23.1%) were prescribed gabapentin as an outpatient prior to admission. Current SUD was identified in 88.1% of the sample, with 65.2% identified as polysubstance positive. Mean daily doses of gabapentin were higher in subjects with positive SUD than in those with no history of SUD. Gabapentin doses ≥ 1,800 mg/d were associated with opiate misuse ($P < .001$), need for detoxification ($P = .004$), and positive hepatitis C status ($P = .001$). Multinomial linear regression revealed that use of gabapentin doses ≥ 1,800 mg/d was predictive of opiate misuse and positive hepatitis C status, with 68.7% positive predictive value.

Conclusion: High-dose gabapentin use can be predictive of opiate misuse disorder. Requests for high-dose gabapentin from patients may signal potential opioid misuse.

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Gabapentin is a medication that was originally approved by the US Food and Drug Administration (FDA) in 1993 as an adjunct treatment for partial seizure disorder, with a subsequent approval for postherpetic neuralgia in 2004.[1] The mechanism of action of gabapentin is not definitively understood; however, it is believed to interact with α2δ-1 subunits of voltage-gated calcium channels.[2] It is also theorized that gabapentin may activate γ-aminobutyric acid (GABA)ergic neurons in the spinal dorsal horn through the increased release of norepinephrine, with subsequent increases in spinal GABA release.[3] Although structurally similar to GABA, gabapentin does not bind to GABA receptors, is not metabolized to GABA or a GABA agonist, and does not inhibit the reuptake of GABA or its degradation.[1]

Gabapentin has been used for many off-label uses with varying degrees of success.[4,5] The evidence behind off-label use has been published in systematic reviews and small clinical trials.[4–18] Use at doses up to 1,800 mg/d in conditions such as chronic neuropathic pain[6] and in alcoholism maintenance treatment[7] yields only moderate evidence of effectiveness. Gabapentin has also been studied in such conditions as fibromyalgia,[8] migraine prophylaxis,[9] complex regional pain syndrome,[10] hot flashes in women treated for breast cancer,[11,12] bipolar disorder,[13] anxiety disorders,[13,14] restless legs syndrome,[15,16] and chronic back pain[17] at doses up to 1,200 mg/d. The evidence behind its use in these conditions has been considered low to equivocal.[4,5] Gabapentin exhibits saturable absorption via L-amino acid transporters; therefore, serum drug levels obtained at doses from 100 mg to 1,600 mg are not proportional.[18] Thus, high doses of gabapentin may be unnecessary when treating various disorders, both approved and off-label.

In the early part of the 21st century, gabapentin was marketed off-label with little to no evidence supporting its use. Many studies used as evidence in the promotion of off-label gabapentin use were fraught with study design issues or various biases.[19–21] In 2004, the manufacturer was found liable for these questionable marketing practices, resulting in numerous legal and monetary sanctions.[22] As an ongoing consequence of this marketing strategy, the rate of off-label use of gabapentin continued to escalate. In a study[23] of off-label prescribing by physicians conducted after the court case, 83% of prescribed gabapentin was found to be off-label, the highest proportion of any of the medications included in the study. A survey of physician knowledge conducted after the court case found that many physicians lacked knowledge about FDA-approved uses and the scarcity of evidence behind many of the off-label uses of gabapentin.[24] Additionally, many clinical decisions involving the prescription of gabapentin for off-label use among psychiatrists, neurologists, and pain management specialists may have been founded on anecdotal or personal testimony of evidence.[25]

Clinical Points

- High-dose gabapentin may be associated with illicit opiate use and positive hepatitis C status.
- Requests for gabapentin in doses ≥ 1,800 mg/d may warrant further investigation of substance use disorder status.
- Physicians should investigate requests for high-dose gabapentin prescriptions in patients claiming back pain or other off-label use.

Gabapentin has recently been reported[26,27] as an emerging drug of abuse. Due to the lack of controlled substance restrictions, as well as the aforementioned off-label promotion, gabapentin may be relatively easy to obtain for illicit use. Possible illicit uses could be for enhancement of other illicit substances or as a cutting agent for heroin.[28] Gabapentin has been abused singularly as a euphoric agent, similar to the physiologic effects of marijuana and alcohol.[29] In a 2014 study[30] from Scotland, the number of gabapentin prescriptions was found to be escalating at a much higher rate than that of reports of neuropathic pain. Mean doses documented in this study[30] were found to be higher than in most published literature (1,343 mg/d), and those prescribed gabapentin were 3 times more likely to admit to analgesic misuse. This report[30] is consistent with reports[31] that the drug is being used in conjunction with other drugs of abuse and even with opioid replacement therapies to enhance the opioid effect. A 2015 study[32] estimated that while 30% of opioid-dependent patients undergoing detoxification were positive for other illicit substances, gabapentin was misused by 22% of the cohort. Gabapentin has also been reported to be concurrently abused along with opiates among clients in a dual-diagnosis correctional population.[33]

The primary objective of this study was to examine substance misuse and rates of abuse in patients admitted to a hospital psychiatric unit who were taking prescription gabapentin during the month prior to admission. We studied the relationship of gabapentin use and dose to various substances of abuse and polysubstance misuse. From this information, we hoped to develop a predictive model for gabapentin use and dose with various substance use disorders (SUDs) and comorbid conditions seen in SUD. Secondarily, we examined gabapentin dose trends in off-label diagnoses and the need for detoxification at hospital admission in gabapentin users.

METHODS

A cross-sectional study was performed from December 2015 through January 2017 for adult patients aged ≥ 18 years admitted to inpatient psychiatry services with any psychiatric diagnosis in a large urban teaching hospital. Inclusion criteria included prescription and outpatient self-administration of gabapentin continually during the month prior to admission to inpatient psychiatry. Subjects admitted to the separate medical-psychiatry detoxification unit were excluded from the study since SUD detoxification was the primary reason for hospital admission in these patients.

Table 1. Demographics of Subjects Prescribed Gabapentin

Characteristic	Value	Significance
Total		
Inpatients	1,483	
Subjects, n (%)	345 (23.3)	
Sex, n (%)		
Men	206 (59.7)	
Women	139 (40.3)	
Age, mean ± SD y		
Overall	43.00 ± 10.23	
Men	42.83 ± 10.14	.702[a]*
Women	43.25 ± 10.39	
Race, n (%)		
White	268 (77.7)	.463[b]*
African American	75 (21.7)	
Hispanic	2 (0.6)	
Glomerular filtration rate, mean ± SD %		
Overall	90.44 ± 25.87	.529[a]*
Men	96.38 ± 25.54	
Women	82.13 ± 24.04	
Substance misuse disorder history, n (%)		
Yes	329 (95.4)	
No	16 (4.6)	
Detoxification necessary at admission, n (%)		
Yes	262 (75.9)	.153[b]*
Men	162 (61.8)	
Women	100 (38.2)	
No	83 (24.1)	
Men	44 (53.0)	
Women	39 (47.0)	
Psychiatric diagnosis, n (%)		
Major depressive disorder	196 (56.8)	
Bipolar depression	89 (25.8)	
Schizoaffective/schizophrenia	37 (10.7)	
Bipolar mania	10 (2.9)	
Posttraumatic stress disorder	7 (2.0)	
Impulse-control disorder	4 (1.2)	
Obsessive-compulsive disorder	1 (0.3)	
Medical detoxification (primary diagnosis)	1 (0.3)	
Prescribed nondetoxification controlled substances, n (%)		
No prescribed controlled substances	216 (62.6)	
Tramadol	17 (4.9)	
Opiates (various)	14 (4.1)	
Benzodiazepine (various)	10 (2.9)	
Carisoprodol	4 (1.2)	
Pregabalin	1 (0.3)	

[a]Independent sample *t* test.
[b]Chi-square test.
*The groups compared are not statistically different.

Sample Size Determination

A published finding[32] of 30% incidence of polysubstance misuse in the opioid-dependent population was the basis for power calculation. In that work,[32] 22% of subjects were concurrently using gabapentin. We chose the higher 30% incidence rate for power calculations to provide a more stringent estimate of potential misuse. The study was powered at 80% with 2-tailed $\alpha = .05$ to detect a 10% higher rate of SUD in our gabapentin-prescribed subjects compared to published results.[32] The 10% difference would require greater subject recruitment. Thus, an a priori sample size of 172 subjects was required.

Table 2. Gabapentin Doses in Various Factors

Factor	n (%)	Dose, mg/d, Mean ± SD (Median)
Gabapentin daily dose, N	345	1,961.74 ± 863.73 (1,800)
Gabapentin dose ranges		
Low (0–900 mg/d)	74 (21.5)	802.70 ± 248.82 (900)[a]
Medium (901–1,800 mg/d)	105 (30.4)	1,598.10 ± 275.61 (1,800)[a]
High (≥ 1,801 mg/d)	166 (48.1)	2,708.43 ± 482.22 (2,400)[a]
Gabapentin dichotomous dose ranges compared to median		
< 1,800 mg/d	113 (32.8)	959.29 ± 305.20 (900)[b]
≥ 1,800 mg/d	232 (67.2)	2,450.00 ± 578.62 (2,400)[b]
Gabapentin prescription by diagnosis		
FDA-approved uses		
Adjunct partial seizure disorder	23 (6.7)	2,204.35 ± 903.27 (2,400)
Post-herpetic neuralgia	0 (0.0)	NA
Off-label uses		
Back pain	116 (33.6)	2,071.55 ± 826.60 (2,400)
Anxiety	96 (27.8)	1,840.63 ± 849.44 (1,800)
Neuropathy	57 (16.5)	1,926.32 ± 1,060.08 (1,800)
Undetermined reason	31 (9.0)	1,890.32 ± 903.27 (2,400)
Alcohol maintenance	13 (3.8)	2,076.92 ± 396.14 (2,400)
Fibromyalgia	12 (3.5)	1,783.33 ± 862.17 (2,100)
Migraine prophylaxis	11 (3.2)	1,845.45 ± 750.15 (1,800)
Bipolar disorder	9 (2.6)	2,133.33 ± 678.23 (1,800)
Complex regional pain syndrome	6 (1.7)	1,800.00 ± 734.85 (2,100)
Detoxification protocol		
Alcohol detoxification protocol	116 (33.6)	1,948.28 ± 859.57 (1,800)
Both detoxification protocols	81 (23.5)	2,070.37 ± 895.47 (2,400)
No detoxification needed	76 (22.0)[c]	1,769.74 ± 899.93 (1,800)
Opiate detoxification protocol	72 (20.9)	2,063.79 ± 771.37 (2,400)
Dose by SUD history		
History of SUD	329 (95.4)	2,021.62 ± 787.80 (2,400)
No history of SUD	16 (4.6)	1,650.00 ± 697.85 (1,800)
Dose by number of substances misused		
Polysubstance	225 (65.2)[d]	2,018.22 ± 854.70 (2,400)
Single substance	79 (22.9)	1,964.56 ± 848.99 (2,400)
No positive results for substances	41 (11.9)[e]	1,646.34 ± 894.18 (1,800)
Positive results by individual substance		
Opiates	164 (47.5)	2,146.67 ± 793.14 (1,800)
Cocaine	153 (44.3)	1,992.16 ± 875.10 (1,800)
Alcohol	136 (39.4)	1,929.57 ± 889.01 (1,800)
Benzodiazepines	117 (33.9)	2,069.39 ± 740.22 (2,400)
Marijuana	104 (30.1)	2,010.58 ± 911.19 (2,400)
Amphetamine	15 (4.3)	2,020.00 ± 636.06 (2,400)
Buprenorphine (not prescribed)	14 (4.1)	2,139.39 ± 917.76 (2,400)
Barbiturates	12 (3.5)	1,908.33 ± 909.00 (1,800)
Prescribed replacement treatments		
Buprenorphine	34 (10.9)	2,096.67 ± 873.16 (2,400)
Methadone	16 (5.1)	2,286.67 ± 877.39 (2,400)
Frequency of substances found in polysubstance screens		
Opiate	140 (62.2)	
Cocaine	138 (61.3)	
Benzodiazepine	111 (49.3)	
Alcohol	106 (47.1)	
Marijuana	96 (42.7)	
Buprenorphine (not prescribed)	14 (6.2)	
Amphetamine/methamphetamine	12 (5.3)	
Barbiturate	11 (4.9)	

[a]Analysis of variance $P < .001$.
[b]Independent sample t test $P = .001$.
[c]Includes positive results for substances that do not require detoxification.
[d]Combination of any drugs of abuse listed.
[e]May include undetectable substances.
Abbreviations: NA = not applicable, SUD = substance use disorder.

Table 3. Determinants for Inclusion Into Multinomial Regression Model[a]

Illicit Substances	Pearson χ^2	*df*	*P* Value
Alcohol	0.332	1	.564
Benzodiazepines	3.148	1	.076
Cocaine	0.042	1	.838
Marijuana	0.968	1	.325
Opiates	*14.745*	*1*	*<.001*
Demographic factors			
Back pain	1.471	1	.225
Off-label use	0.155	1	.694
Sex	0.660	1	.417
Race	3.555	2	.169
Polysubstance	5.791	2	.055
Detoxification needed	*8.424*	*1*	*.004*
Hepatitis C positive	*11.594*	*1*	*.001*

[a]Italics indicate statistically significant at $P < .01$.

Data Collection

Data were collected from all subjects admitted to the adult psychiatric unit who were taking gabapentin during the month prior to admission. Gabapentin doses were collected from patient medication reconciliation and outpatient pharmacy records. Medical or psychiatric indications for gabapentin use were recorded and categorized into FDA-approved or off-label use. Admission urine drug analysis results were collected for drugs of abuse and alcohol using a 12-drug panel (Bio-Rad Laboratories, Hercules, California). Further collected data included the need for medical detoxification at admission and the number of and specific substances present in the urine drug screening (if any). Controlled substances prescribed in the month prior to admission were counted as a negative urine test result for illicit substance misuse. Positive screen results for buprenorphine or methadone were confirmed with the outpatient provider of these opiate replacement services and, if confirmed, counted as a negative result.

Statistical Analysis

Demographic data were analyzed descriptively. Mean daily doses of gabapentin were analyzed overall and by concurrent use of each observed substance of abuse, subject history of SUD, polysubstance misuse, reported gabapentin indication (approved or off-label), need for detoxification at hospital admission, detoxification protocol(s) used, and opiate replacement therapy.

Gabapentin dose ranges were coded as high dose: ≥ 1,800 mg/d and low dose: 0–1,799 mg/d. Chi-square testing was performed comparing gabapentin dose range use to demographics, comorbid conditions, and positive illicit drugs. As a secondary analysis and to validate the use of categorical high and low dose ranges, the dose range 0–1,799 mg/d was further recoded into 900–1,799 mg/d and 0–899 mg/d to examine any differences within these dose ranges.

To determine if a predictive model could be derived describing high-dose gabapentin use in the presence of SUD, significant factors identified from the previous analysis were entered into a multinomial logistic regression model, controlling for demographics. The study was approved by the

Table 4. Multinomial Logistic Regression Results and Positive Predictive Value of Model[a]

Likelihood Ratio Tests

Effect	Model Fitting Criteria: −2 Log Likelihood of Reduced Model	Likelihood Ratio Tests χ^2	*df*	*P* Value
Intercept	185.051	0.000	0	
Sex	185.190	0.139	1	.709
Race	185.621	0.570	1	.450
Back pain	186.395	1.344	1	.246
Off-label use	185.632	0.581	1	.446
Polysubstance positive	186.279	1.228	1	.268
Opiate positive	*190.572*	*5.521*	*1*	*.019*
Hepatitis C positive	*192.491*	*7.440*	*1*	*.006*
Detoxification needed	187.232	2.181	1	.140

Regression Significant Factors[b] (Reference: ≥ 1,800 mg/d)

Factor	B	SE	Wald	*df*	*P* Value	Exp(B)	95% CI
Intercept	2.960	0.999	8.774	1	.003		
Sex	0.091	0.244	0.139	1	.709	1.095	0.679–1.766
Race	0.209	0.276	0.577	1	.448	1.233	0.718–2.117
Back pain	0.305	0.265	1.327	1	.249	0.737	0.439–1.238
Off-label use	0.531	0.717	0.548	1	.459	1.701	0.417–6.936
Polysubstance positive	0.249	0.226	1.216	1	.270	1.283	0.824–1.997
Opiate positive	*0.666*	*0.284*	*5.499*	*1*	*.019*	*1.947*	*1.116–3.398*
Hepatitis C positive	*0.791*	*0.300*	*6.960*	*1*	*.008*	*2.206*	*1.226–3.971*
Detoxification needed	0.533	0.361	2.181	1	.140	1.704	0.840–3.455

Positive Predictive Value of Model

Observed	Predicted 0–1,799 mg/d	Predicted ≥ 1,800 mg/d	Percent Correct
0–1,799 mg/d	20	93	17.7%
≥ 1,800 mg/d	15	217	93.5%
Overall percentage	10.1%	89.9%	68.7%

[a]Italics indicate statistically significant at $P < .05$.
[b]Nagelkerke pseudo $R^2 = 0.107$.

hospital institutional review board to ensure protection of human subjects in accordance with the Declaration of Helsinki. All statistical analyses were performed using SPSS 24.0 (IBM Corporation, Armonk, New York).

RESULTS

There were 1,483 admissions to the adult psychiatric unit during the 14-month study period. Of these, 345 subjects (23.3%) met inclusion criteria for gabapentin use at the time of hospital presentation, with 329 subjects positive for SUD history (95.4% of the gabapentin users). Positive illicit urine drug analyses were found in 304 subjects (88.1%), while polysubstance misuse was identified in 225 subjects (65.2%). Medical detoxification from drugs of abuse was warranted in 75.9% of gabapentin users. Subject demographics, diagnoses, and concurrent prescribed controlled substances are summarized in Table 1.

Gabapentin mean doses in various diagnoses and concurrent illicit substance use are presented in Table 2. The lowest mean daily gabapentin dose was found among subjects with no SUD history (16 subjects; 1,650.00 ± 697.85 mg/d). When considering all reasons for gabapentin use, the highest mean daily dose was among those who took gabapentin for the FDA-approved use of adjunct partial seizure disorder. For subjects with a SUD history, the highest mean daily dose was among patients receiving methadone maintenance treatment (20 subjects; 2,286.67 ± 877.39 mg/d). Mean doses of gabapentin were also higher in subjects taking illicit compared to prescribed buprenorphine. Illicit opiate misuse, either as a single agent or as part of polysubstance misuse, was identified in 47.5% of urine drug screens. This subgroup used a mean gabapentin dose of 2,146.67 ± 793.14 mg/d, the highest mean dose for any positive illicit substance group.

Factor Identification and Analysis

Chi-square analysis of each drug of abuse and demographic factors compared to gabapentin dose determined that subjects who were illicit opiate positive ($P < .001$), required detoxification at hospital admission ($P = .004$), or were hepatitis C positive ($P = .001$) were more likely to be taking gabapentin doses ≥ 1,800 mg/d. Doses in polysubstance misuse versus single-substance or no substance misuse trended toward significance ($P = .055$). No other drugs of abuse were significantly different between dose ranges. The secondary analysis of the same drugs and factors comparing low- (0–899 mg/d) and medium-dose (900–1,799 mg/d) gabapentin use showed no significant difference with any drug or factor. Results are presented in Table 3.

Multinomial Logistic Regression

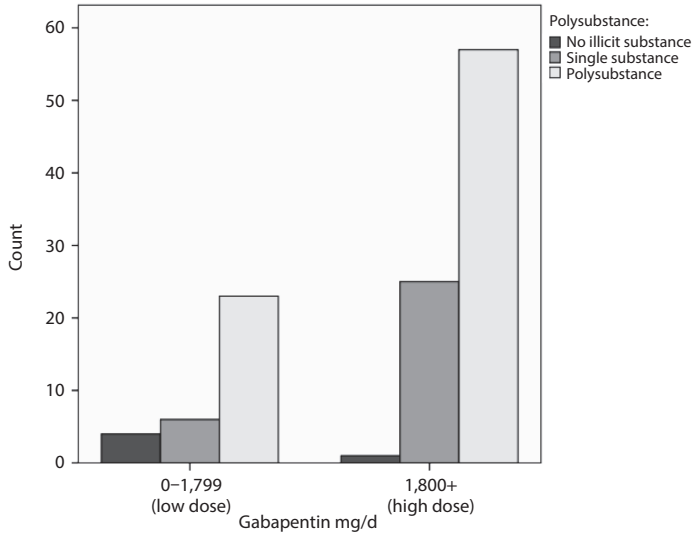
Statistically significant drugs and factors were entered into a multinomial logistic regression to determine the predictability of these factors in signaling high-dose gabapentin. Opiate misuse, positive hepatitis C status, and need for detoxification at admission were analyzed, controlling for demographics and off-label use. Results suggest that high-dose gabapentin users may be nearly twice as likely to be illicit opiate positive (odds ratio [OR]=1.947; 95% CI, 1.116–3.398; $P = .019$). Further, these subjects are also more than twice as likely to be hepatitis C positive (OR = 2.206; 95% CI, 1.226–3.971; $P = .008$). The model yielded a 68.7% positive predictive value. Results of the model are presented in Table 4.

Off-Label Use

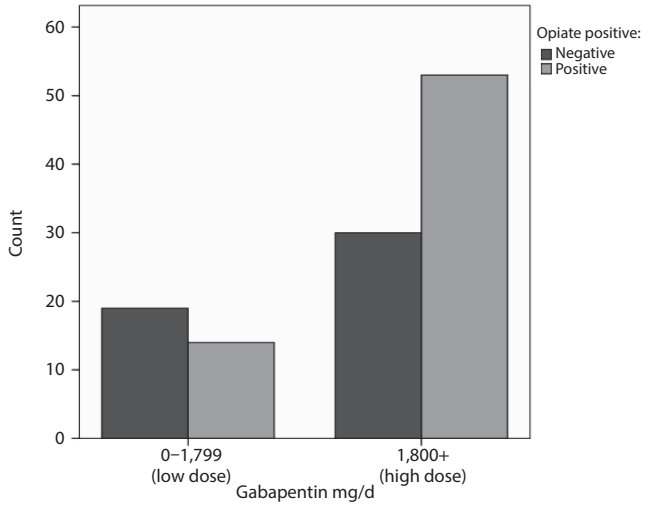
The 4 most common off-label uses (back pain, anxiety, neuropathy, and undetermined use) were analyzed as subsets comparing gabapentin doses to substances commonly used in a diagnosed category or polysubstance abuse status. High-dose gabapentin was significantly associated with illicit opiate misuse in subjects claiming back pain as the use for gabapentin ($\chi^2_1 = 4.445$, $P = .035$) (Figure 1). These subjects were also more likely to be polysubstance dependent ($\chi^2_2 = 7.791$, $P = .020$). In subjects claiming anxiety as the reason for off-label use, no difference was found in gabapentin dose range

Figure 1. Comparison of Significant Findings in Off-Label Use of Gabapentin

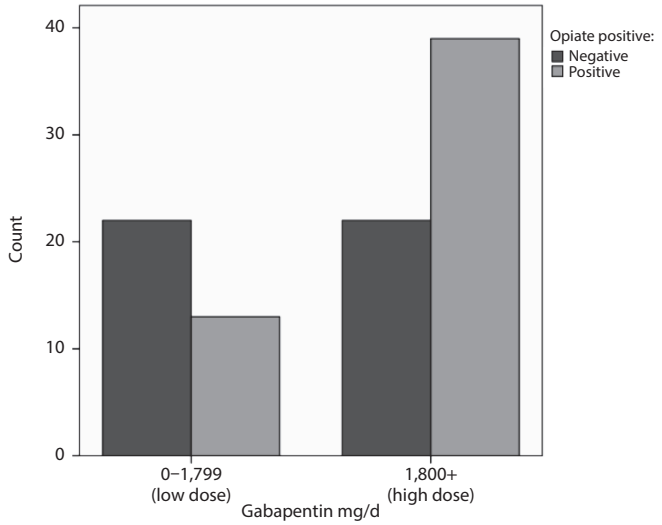
A. Polysubstance Misuse in Off-Label Back Pain Use[a]



B. Opiate Misuse in Off-Label Back Pain Use[b]



C. Opiate Misuse in Off-Label Anxiety Use[c]



[a]$\chi^2_2 = 7.791$, $P = .020$.
[b]$\chi^2_1 = 4.445$, $P = .035$.
[c]$\chi^2_1 = 6.430$, $P = .011$.

compared to illicit benzodiazepine use ($\chi^2_1 = 0.083$, $P = .773$) or polysubstance misuse ($\chi^2_2 = 1.964$, $P = .375$); however, subjects claiming anxiety were more likely to be positive for illicit opiates ($\chi^2_1 = 6.430$, $P = .011$). In subjects who claimed either neuropathy or an undetermined reason for gabapentin use, no differences in illicit substances or polysubstance misuse were found.

DISCUSSION

Mental health patients who are taking gabapentin at doses of 1,800 mg/d or higher exhibit greater probability of having a concurrent opiate misuse disorder than patients receiving less than 1,800 mg/d. Further, these patients are more likely to have a positive hepatitis C status. These findings raise a potentially clinically significant question as to whether gabapentin has addiction potential or whether use of gabapentin in conjunction with illicit substances such as opiates enhances the euphoric effects of the illicit substances.

Gabapentin use was identified in 23.1% of the total number of admissions to the mental health unit; however, 95.4% of the patients prescribed gabapentin had substance misuse history, either current or remote. Our population yielded 225 subjects who were current polysubstance misusers, comprising 65.2% of the total cohort of gabapentin recipients. These numbers were substantially higher than the published 30% polysubstance misuse estimates found by Wilens et al[32] used for sample size determination. Additionally, mean daily doses used in patients with SUD history were higher than for those with no SUD history, although the difference was not statistically significant. SUD mean daily doses were also much higher than the doses studied in off-label studies, potentially signifying further illicit use of gabapentin.

Since our sample exhibited high rates of gabapentin use and potentially excessive doses in patients with SUD, especially those with illicit opiate use, model determination that could predict potential SUD in patients requesting escalating gabapentin doses was undertaken. To our knowledge, this work is the first attempt to determine a model predictive of high-dose gabapentin use in those with SUD, specifically opiate misusers. Opiate misuse may be either single-agent opiate misuse or a component of polysubstance misuse. Patients who take gabapentin doses ≥ 1,800 mg/d have nearly twice the likelihood of being illicit opiate positive and greater than double the likelihood of concurrently having hepatitis C while controlling for sex, race, off-label uses, need for detoxification at admission, and polysubstance misuse. The model yielded a 68.7% positive predictive value; therefore, it may be helpful for clinicians to consider these factors when patients request escalating doses of

gabapentin. Illicit opiate use and positive hepatitis C status should be explored prior to agreeing to higher doses. Despite a statistically insignificant finding, polysubstance misuse trended toward significance and should not be ruled out in patients administering high-dose gabapentin.

Despite the paucity of evidence for off-label use, 93.3% of all recipients of gabapentin were taking the drug for an off-label use. In contrast to doses (900–1,800 mg/d) in off-label studies,[6–14] the high-dose users were the largest group, with a median dose of 2,400 mg/d. Interestingly, 9% of subjects received mean gabapentin doses of approximately 1,890 mg/d with no determinable diagnosis for use of the medication. On the basis of prior evidence that opiate abusers have used gabapentin to enhance opiate effects, it can be theorized that these patients may employ secondary gain or diversionary behaviors such as "doctor shopping" to obtain gabapentin, which is a noncontrolled substance. Nebulous alleged off-label use symptoms such as back pain or anxiety may be reported to obtain the drug for possible illegitimate intentions.

A descriptive finding of this study revealed that in patients who are prescribed methadone maintenance treatment for opiate misuse history, mean doses of gabapentin were found to be even higher than those used concurrently with other illicit drugs. Buprenorphine maintenance treatment also produced mean doses similar to those taken by subjects misusing illicit substances. A possible reason for these higher doses may be that after receipt of opiate replacement treatment, patients may see a separate physician who is unaware of the patient's participation in a replacement program. Use of a noncontrolled substance such as gabapentin for claimed off-label symptoms may be perceived as a safe alternative for treatment; however, the patient's intentions may be to enhance effects of opiate replacement therapy.

There are limitations to the application of the results of this work. All subjects were recruited from a single inpatient mental health unit within a large urban hospital, which limits generalizability to all populations. Thus, application of results to non–mental health populations should be applied with caution. Future work should make these estimations in multiple sites to improve generalizability. There were also an extraordinarily large number of subjects diagnosed with major depressive disorder. A possible explanation may have been the result of substance misusers seeking admission to the hospital for secondary gain, such as claiming suicidal thoughts to obtain short-term housing. In such cases, some subjects would be considered appropriate for the separate medical detoxification unit and would have been excluded from the study. Another limitation may be that despite subject data collection at admission through medication reconciliation and from outpatient pharmacy databases, potential limitations to the accuracy of collected data could exist. A final, yet unlikely, limitation is that gabapentin may have been prescribed as an "opioid sparing" strategy by some prescribers. Since prescribed controlled substances were counted as a negative urine drug screen, only true illicit positive results were considered.

CONCLUSION

Gabapentin, as a noncontrolled substance, has the potential for misuse in patients with a substance misuse disorder, particularly in those using illicit opiates. Physicians should consider the potential of opiate misuse and concurrent hepatitis C in their patients who request high doses of gabapentin. Regulatory agencies may consider placing gabapentin in a controlled substance status, limiting the ease of accessibility to the drug. Classification of gabapentin as a controlled substance may help to curtail illegitimate and potentially dangerous use of the drug.

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