



“My Patient Can’t Sleep”: Resident-Led Curriculum Development for Insomnia Management

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Abstract

Objective Insomnia is a prevalent complaint on acute psychiatric units. When not addressed by primary treating teams, patients request sleep aids “as needed,” leading to increased burden on on-call residents and decreased individualized treatment. The authors implemented a new educational curriculum and computer order set for inpatient insomnia management, and examined changes in residents’ comfort level in its management and in inpatient sleep medication ordering patterns.

Methods In this IRB-approved quality improvement project, the authors identified best practices for insomnia management, developed a new curriculum for psychiatry residents, and created a “Sleep Order set” in the electronic medical record (EMR). Residents were surveyed and EMR queried for sleep medication orders for 6 months pre- and post-intervention.

Results The level of comfort of the residents in ordering a variety of sleep medications increased significantly. Sleep medication orders placed by primary teams surged from 938 during the pre-intervention period to 1801 post-intervention ($p < 0.001$), while those placed by on-call teams fell considerably.

Conclusion Education on insomnia management boosted residents’ confidence in handling inpatient sleep disorders. Implementation of the new resident-developed “Sleep Order set” greatly reduced the work load of on-call residents, in terms of “as needed” sleep medication orders.

Keywords Insomnia · Inpatient psychiatry · PRN medications · Sleep management

Insomnia is perceived as inadequate sleep often related to and associated with difficulty initiating or maintaining sleep, or frequent awakenings and inability to fall back asleep [1]. It is a common complaint in hospitalized patients in general, and in acute psychiatric care units in particular [2], with distorted sleep patterns noticeable in practically all major psychiatric disorders [3]. However, little attention has been dedicated to this particular care setting [2].

Medication choice is influenced by several factors such as the type of insomnia, half-life, adverse effects, and cost and availability in hospital formulary, as well as knowledge and comfort level of prescriber, in our case psychiatry residents. While post-graduate education in sleep medicine can meet this need, neither the Accreditation Council for Graduate Medical Education (ACGME) for psychiatry, nor the psychiatry milestones, requires any specific training on the management of sleep disorders.

In our Community Mental Health Center, the most common way of addressing insomnia in acute psychiatric units is by the use of PRN (PRN from Latin *pro re nata* meaning in the circumstances or as the circumstance arises) medications. Administration of PRNs by nursing staff is the common and consistent practice on inpatient psychiatric units, and in almost a quarter of the cases (22.15%) the indication is insomnia [2, 4–13], mostly due to patients requesting sleep aids. In a recent analysis of PRN medication use (8200 PRNs) at a Canadian hospital over a 3-month period, over 90% of psychiatric patients received at least one PRN with benzodiazepines topping the list, and the indications in 82% cases being (in order of frequency) anxiety, insomnia, and agitation [14]. However, PRNs are known to be associated with an increased risk of morbidity, overuse, dependence, confounding the assessment of efficacy and side effects of standing medications, adverse drug interactions, and polypharmacy [11–16].

The primary treatment team is mostly unaware of what sleep medications their patients received during the night, until after the fact. It not only puts an additional burden on

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on-call treatment teams but more importantly, these patients may not receive the individualized treatment their primary teams could employ following review and consideration of their specific clinical needs.

This quality improvement project was initiated to improve the level of confidence of residents to manage insomnia on inpatient psychiatric units, individualize the treatment, and minimize one-time sleep medication orders for the on-call team. The authors hypothesized that there would be a decrease in PRN medication orders following their educational program, and an increased range of medications used, other than diphenhydramine (current most frequently used one), reflecting an augmented personalized treatment approach. It is also hypothesized that there would be a decrease in the perceived “on-call burden” of managing insomnia on inpatient units.

Methods

This is an IRB-approved quality improvement study conducted at Maimonides Medical Center, a large, urban, community-based teaching hospital in the USA.

Curriculum for Inpatient Insomnia Management

A review of literature was conducted to develop a comprehensive educational program, to shift the task of identifying and treating insomnia to the patient’s treating team. The search terms used individually and cross-referenced were insomnia, inpatient, prn, zolpidem, benadryl, diphenhydramine, temazepam, zaleplon, melatonin, and **trazodone**. PubMed, PsycINFO, and Google Scholar were used and searches limited to English language papers. Medications selected were based on the hospital’s formulary. The search returned 38 total publications—11 possibly relevant and 1 relevant. Only publications addressing the use of PRN medications for insomnia management in acute care psychiatric patients were considered relevant. Based on information gathered and input from attending psychiatrists (unit and service directors) and pharmacy department, a new curriculum was developed to teach psychiatry residents the most up-to-date practices of treating sleep disturbances. This included a powerpoint presentation and a 1-h lecture for all residents, along with physical summary handouts posted on the units and in ER on the following medications: diphenhydramine, **trazodone**, doxepin, temazepam, zolpidem, mirtazapine, and melatonin, with their dosages, half-lives, side effects, and contraindications. Additional monthly sessions were scheduled on inpatient units and in ER during educational rounds in the presence of attending psychiatrists and other staff. Reviewing sleep quality was included in daily workflow on inpatient units.

Computerized Sleep Order Set

As a process-improvement intervention, psychiatry residents and the project team created a computerized order set for addressing inpatient sleep disturbances, based on input from Pharmacy and EMR departments, and approved by departmental leadership. By typing “sleep” in the EMR, this “Sleep Order set” displays the same list of medications given above with options, for dosages and frequencies, and to make a medication either a standing or a PRN order (by checking/unchecking boxes). For improved safety, it also has a pop-up window showing drug-drug interaction alerts, based on other medications prescribed to the specific patient (as in the hand-out table).

Resident Surveys

Pre- and post-education surveys were administered to all psychiatry residents. They were asked to rate (1) how comfortable they were ordering sleep aids for patients while they were the primary team, as well as on-call team; (2) which sleep aid they generally order for patients they were not the primary physician for; (3) how many requests (pages) they receive while on-call for PRN sleep aids. In addition, the survey assessed how often the residents were addressing insomnia with their patients when acting as the primary psychiatrist. Six months after implementation of the new educational intervention and computerized Sleep Order set, the same survey was re-administered.

EMR Queries

Data were collected from 1 January 2016 to 30 June 2016 (pre-implementation period) and from 1 September 2016 to 28 February 2017 (post-implementation period), on all orders for the above-mentioned insomnia treatment medications administered to patients (excluding orders which were never administered or given for indications other than insomnia, namely, hydroxyzine for anxiety and diphenhydramine for allergies). The type of order (standing or PRN) and time of order were recorded and attributed to primary team versus on-call team based on that (before 6 p.m. orders are put in by primary team, after 6 pm, nights and weekends by on-call team). PGY 1 and 2 residents form the inpatient primary teams, supervised by PGY4s in a junior attending psychiatrist role, as well as by attending psychiatrists. On an average, about 5% of inpatients are followed by only attending teams (without residents). Medication orders from such teams were not excluded. PGY 1, 2, and 3s form the on-call teams, supervised by a per diem attending; therefore, all on-call orders are placed by residents. All data were de-identified and no personal information of patient or provider was collected.

Statistical Analysis

Data management and analyses were performed with IBM SPSS 24.0 (IBM Corp., Armonk, NY). Data are presented as mean \pm SD for continuous variables and proportions for categorical variables. Differences in number and frequency of orders between pre- and post-intervention periods were compared using a Chi-square test, while differences in continuous variables were compared using a Mann-Whitney *U* test. Pre- and post-survey scores for resident comfort levels were compared between the two periods to determine the effect of the educational intervention. All tests used a level of significance of < 0.05 .

Results

Resident Surveys

Level of Comfort in Managing Insomnia Out of 37 residents in the adult psychiatry training program, 27 participated in the pre- and 22 in the post-educational intervention surveys, respectively. There were no significant differences in any demographic data between the two groups. Comfort level scores (Fig. 1) differed in pre- and post-intervention periods trending to significance ($p = 0.058$), with post-intervention results showing only one resident reporting “not comfortable” and none feeling unprepared for managing insomnia. All of the post-survey respondents reported feeling at least “somewhat comfortable” with ordering a variety of sleep medications available on formulary.

On-Call Burden The number of requests for sleep PRN medications varied between the two study periods. Although some differences were stark, as in the case of no resident receiving more than 8 requests/night post-intervention, and only 5% of

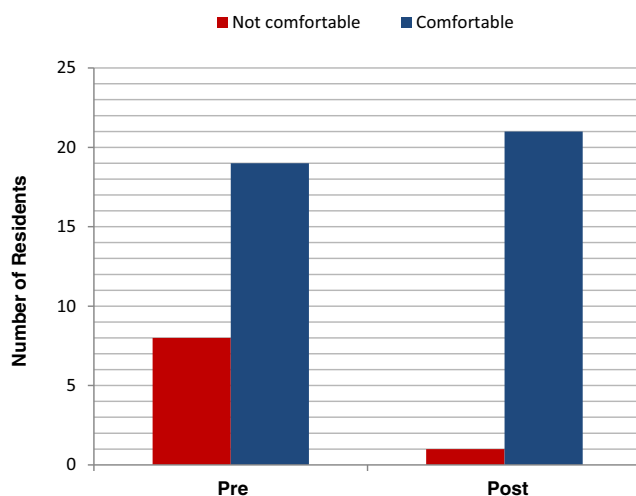


Fig. 1 Comfort level of residents on-call ordering sleep medications

residents having to place more than 6 orders/night as compared with 22% reported in pre-intervention, overall, it did not reach statistical significance ($p = 0.11$). The number of residents receiving less than 3 requests per night increased to 54% from 41% pre-intervention.

Knowledge of Various Sleep Medications Diphenhydramine was the first choice as reported by 19 and 17 residents in pre- and post-intervention periods, respectively. Trazodone was the other popular choice with 8 residents' (pre-intervention) and 4 residents' (post-intervention) self-reports. While on-call, most residents were a lot less comfortable with other choices like melatonin and zolpidem (only 2 residents each); post-intervention, they added quetiapine (2 residents) and hydroxyzine (1 resident) to their repertoire.

EMR Data

During pre-intervention period (01/01/2016–06/30/2016), sleep medications were administered 1481 times for 711 admissions, as compared with 2497 times for 659 admissions in post-intervention period (09/01/2016–02/28/2017), despite the 52 less admissions in the latter ($p < 0.001$). Sleep medication orders placed by primary teams were 938 (63%) in pre-intervention period rising to 1801 (72%) post-intervention. On the other hand, orders placed by on-call teams were 543 (37%) and fell significantly post-intervention to 696 (28%) ($p < 0.001$). There was a notable reduction (16%) in the overall sleep aid PRN orders (38 to 22%, $p < 0.01$) and a considerable increase in standing orders (33 to 61%, $p < 0.01$) in the post-intervention period.

The investigators intended to look at differences in actual prescribing patterns before and after this intervention; however, melatonin was added to the formulary during the post-intervention period making the results of this analysis difficult to interpret. The impact of the formulary changes on these data cannot be overlooked as the different sleep aid orders are not independent variables. While the number of melatonin orders in the pre-intervention period cannot be obtained from the EMR, it accounted for 22% of the orders after it was added to the formulary in the post-intervention period. At the same time, for diphenhydramine, the most prescribed PRN sleep medication in both periods, orders decreased from 50 to 29% post-intervention ($p < 0.001$). For trazodone, the second most-ordered sleep medication, no such differences were observed between the two periods.

Zolpidem orders decreased by 2% (182 vs 130 orders), proportionate to the decrease in orders by primary team. Temazepam orders increased by 3.6% (9 vs 105 orders) post-intervention with 1% orders being placed by on-call teams, as compared with none during pre-period. Doxepin and hydroxyzine, the least administered medications in both periods, were primarily ordered by on-call team.

Discussion

The authors undertook this quality improvement initiative to increase the level of confidence among trainees in managing insomnia and to promote a more personalized approach for acute care psychiatry patients.

Creation of a Computerized “Sleep Order Set” as an Educational Tool

Developing and implementing an innovative computerized order set, making it extremely easy to access (just by typing “sleep” into the order entry portal) and displaying the full gamut of medication choices (with dosages, side effects, and individualized “pop-ups” warning about drug-drug interactions based on each patients’ individual medications), were the single most-influential and cost-effective technical solution for an adaptive problem. Residents could readily draw on this information in making the choice of medication for their patient, and the constant exposure to the entire list of our insomnia formulary increases the chances of information retention, and complements the didactic curriculum. This intervention is also easily generalizable to any system using an EMR, and potentially for other common on-call requests like anxiety, agitation, and pain.

Boosted Knowledge and Comfort in Sleep Medication Prescribing

The increase in comfort of the residents in ordering a variety of sleep medications in post-intervention period is encouraging and suggests that such an educational intervention has the potential of closing any knowledge gaps. The reduction in number of unprepared residents is one of the most important outcomes of this intervention.

Impact on Work Load of Psychiatric Trainees

The significant decrease in the number of orders placed by on-call teams suggests our educational intervention achieved its goal of decreasing the burden on prescribers providing coverage. The overwhelming increase in orders placed by primary teams indicates that insomnia is now routinely evaluated and addressed for our inpatients, which could lead to better quality of care, and potentially improved overall symptoms. As all residents were included in pre- and post-intervention surveys, the effect of residents being on different rotations (on-call vs primary team) would be similar for both periods.

Influence on the Choices of Sleep Medications

Although diphenhydramine remained the most prescribed in both periods by both on-call and primary teams, there was a notable drop in the absolute number of orders. **Trazodone**

remained the second most prescribed medication in both periods, followed by melatonin, which are both considered appropriate sleep aids with benign side effect profiles. The additional medications mentioned in post-surveys (zolpidem, quetiapine) as well as in the EMR data (temazepam) ordered even by on-call teams, point to increased confidence and a more patient-centered treatment approach, tailored to the needs and comorbidities of each individual. It is plausible that the overall improvement could be due to creation of the computerized Sleep Order set. However, these findings may not be independent of melatonin’s inclusion in the formulary in post-implementation period. This change in formulary during the study period limits our ability to establish that there were indeed significant differences in sleep medication ordering patterns following implementation of the educational intervention. As the resident surveys were anonymous and the EMR queries de-identified, our data cannot ascertain if there were any differences in prescribing patterns within different providers post-implementation.

A few limitations need to be considered when interpreting our results: (1) single center study, (2) pre- and post-responders may have been different (surveys were completed anonymously, not all residents responded), (3) patients’ response to medications were not recorded, (4) significant decrease in diphenhydramine orders may possibly be due to increased prescribing of melatonin that was added to the formulary post-intervention, and (5) although attending psychiatrists were involved in the development, revision, and approval of the order set and curriculum, they were not surveyed. These limitations and the multitude of confounding factors (different demographics, psychiatric diagnoses, comorbidities, and medication lists of our patient populations, as well as previous data showing similar efficacy) would not allow us to draw valid conclusions on the actual treatment of insomnia.

In conclusion, the two most important generalizable outcomes of our project were the increase in total sleep orders suggesting routine assessment for sleep disturbances and increase in orders made by primary teams suggesting individualized management of insomnia. In addition, the computerized order set is an easy and inexpensive educational tool, and should be considered as a necessary and useful part of the EMR and curriculum.

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Compliance with Ethical Standards

This work was completed in compliance with federal, state, and institutional regulations, the Committee on Publication Ethics (COPE) guidelines, as well as confidentiality standards.

Ethical Considerations This study was approved by the Maimonides Institutional Review Board/Research Committee (study no. 2016-12-10).

Disclosures On behalf of all authors, the corresponding author states that there is no conflict of interest.

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