

Potentially inappropriate prescription of hypnotic drugs in the elderly: a quality improvement project

Clarissa-Marie Zehlicke, Lisa Massa, Francesco Laybats,
Saud Aldhuhli, Gareth Grech, John Cordina

Introduction and Background: Both the American Beers Criteria and the STOPP/START criteria for potentially inappropriate prescribing in older people, have recommended that benzodiazepines and Z-drugs should be avoided in older adults with a history of falls or fractures. Unfortunately, their misuse and overuse remains a worldwide epidemic. An initial audit at our rehabilitation hospital showed a significant increase in the number of patients discharged on hypnotics when compared to admission. To improve our practices we carried out a quality improvement project and a re-audit.

Methods: Multiple educational interventions were carried out. In a 2nd cycle audit we retrospectively analysed the proportion of geriatric patients admitted versus discharged on hypnotics from our rehabilitation hospital throughout 2022. We assessed for a concurrent history of falls or fractures. Results were compared to the 1st cycle.

Results: 1033 patient records were initially examined. Of those included, 132 (17.6%) were discharged on a hypnotic in the 2nd cycle compared to 183 (19.3%) in the 1st cycle. This change did not reach statistical significance. 55% had adequate documentation of prescription rationale in the 2nd cycle compared to 43% in the 1st cycle ($p = 0.046$). The majority of patients discharged on treatment had a history of fractures or falls in both cycles.

Conclusion: Prescribing practices did not improve significantly following our educational interventions. Whilst educational interventions may help with raising awareness, individually they are often not enough to instil change in practices. Multi-faceted and targeted interventions should be the focus of future attempts at improving outcomes.

Dr Clarissa-Marie Zehlicke
MD, MRCP (UK) (Geriatric Medicine)
Department of Geriatrics,
Karin Grech Rehabilitation Hospital,
Pieta, Malta

Dr Lisa Massa, MD, MRCEM (UK)
Department of Emergency Medicine
Mater Dei Hospital,
Msida, Malta

Dr Francesco Laybats
MD, MSc T&O (QMUL), MRCS (Dublin)
Department of Trauma & Orthopaedic Surgery
Mater Dei Hospital,
Msida, Malta

Dr Saud Aldhuhli, MD
Department of Medicine
Mater Dei Hospital,
Msida, Malta

Dr Gareth Grech, MD, MRCP (UK)
Department of Medicine
Mater Dei Hospital,
Msida, Malta

Dr John Cordina, MD, FRCP (Edin)
Department of Geriatrics,
Karin Grech Rehabilitation Hospital,
Pieta, Malta

Falls and fractures remain major health concerns for the elderly, significantly impacting their morbidity and mortality. The role of clinicians in mitigating these risks through judicious prescription practices is vital. Benzodiazepines and Z-drugs, often prescribed for their sedative and hypnotic effects, have been identified as contributing factors to an increased risk of falls and fractures in this patient demographic.^{1,2}

Benzodiazepines and Z-drugs act by activating the gamma-aminobutyric acid (GABA) receptors in the central nervous system. While effective for their intended uses of calming patients and sedative effects to manage insomnia, their side effects, particularly in the elderly, necessitate careful consideration and monitoring.

Both the American Beers Criteria and the STOPP/START criteria for potentially inappropriate prescribing in older people, have strongly recommended that benzodiazepines and Z-drugs should be avoided in older adults with a history of falls or fractures.^{3,4} Unfortunately, their misuse and overuse remains a worldwide epidemic.^{5,6}

The primary focus of our initial audit carried out at a local rehabilitation hospital, was to review the prescription patterns of benzodiazepines and Z-drugs in elderly patients admitted for rehabilitation throughout 2019. Findings showed a significant increase in the number of patients discharged on benzodiazepines and/or Z-drugs when compared to admission. Of the patients discharged on these drugs, the majority of patients had a documented history of falls and/or fractures. This highlighted the importance of better regulation of the use of hypnotics in the elderly and also highlighted the need for improved documentation of diagnosis and rationale for prescription of such drugs.⁷

The ongoing monitoring and re-evaluation of prescription practices are crucial in ensuring patient safety and improving outcomes. In order to improve our practices we implemented a quality improvement project and carried out a re-audit, not only to serve as a tool for assessment, but also as an educational and awareness-raising platform for healthcare providers.

MATERIALS AND METHODS

In order to improve patient quality of care, a number of education interventions were carried out

following the initial audit results and feedback. This included 1) a verbal intervention comprising of an interactive educational lecture directed at physicians of all grades working within the department of geriatrics, 2) dissemination of an electronic educational bulletin to all physicians and allied health professionals within the department, highlighting key outcomes and recommendations 3) an oral presentation at a national conference directed specifically at local junior doctors, with distribution of results and recommendations. Throughout all 3 interventions, emphasis was placed on the need for improved documentation of prescribing rationale, the importance of initiating deprescribing of hypnotics and the significance of alternative treatment and management options.

A second cycle audit was conducted to assess for changes in prescribing and documentation practices following the aforementioned interventions. Approval was obtained from the hospital's Research Committee, Data Protection Officer and Executive Director prior to commencement.

We retrospectively analysed the proportion of geriatric patients admitted versus discharged on benzodiazepines and/or Z-drugs from the local rehabilitation hospital throughout 2022. We also assessed the percentage of patients discharged on benzodiazepines and/or Z-drugs with a concurrent history of falls or fractures. Note was made of significant comorbidities and diagnoses. Results were compared to those seen in the first cycle.

Patient Selection

The whole population of patients discharged from the local rehabilitation hospital between 1st of January 2022 and the 31st of December 2022 were included in the study. The follow patients were excluded: age less than 65 years, those discharged to the acute hospital or those who were deceased prior to discharge.

Information Resources

Two primary information sources were utilized: Electronic Case Summary (ECS) system was used in assessing medication history on admission and discharge from hospital, any documented psychiatric diagnoses, and history of falls/fractures. iSoft Clinical Manager (iCM) was used for

relevant imaging reports identifying site and year of previous fractures, and imaging requests for falls requiring assessment.

AUDIT DESIGN AND STATISTICAL ANALYSIS

Microsoft Excel Spreadsheet was used for data input and tabulation. The processed data for each patient included drugs on admission and discharge (specifically benzodiazepines and Z-drugs, including name, dose). Any change in dose between admission and discharge was noted. For those patients discharged on benzodiazepines and/or Z-drugs, additional data collected encompassed documented psychiatric history, history of falls, history of fractures, site and year of fracture/s.

Following tabulation, data analysis was carried out. Where statistical significance was sought, analysis was carried out by an independent statistician, using the chi squared test of association.

RESULTS

A total of 1033 records of patients discharged between the 1st of January and the 31st of December were initially examined (see [Figure 1](#)). The following patients were excluded: 43 were deceased prior to discharge, 81 were aged <65 years and 159 were transferred to the acute hospital; 1 patient was

Table 1 Patients on treatment on admission versus discharge

On treatment ^a	On admission	On discharge	% change on discharge
1 st cycle	n= 148 (15.6%)	n= 183 (19.3%)	+3.7% (p=0.034)
2 nd cycle	n= 109 (14.6%)	n= 132 (17.6%)	+3% (p=0.106)

^aon benzodiazepine and/or Z-drug; n= total number of patients

subsequently excluded due to an incomplete admission document. Data collection and analysis commenced on a total of 749 patients. A total of 948 patients had met inclusion criteria for the 1st cycle.

Of those included, 183 (19.3%) were discharged on either a benzodiazepine or a Z-drug in 2019 whilst 132 (17.6%) were discharged on treatment in 2022. This showed a decrease (-1.7%) in patients being discharged on treatment following the quality improvement initiatives. However, this positive change did not reach statistical significance (p = 0.377).

Whilst during 2019 there was a statistically significant increase in the prescription of benzodiazepines or z-drug from admission to discharge (+3.7%; p = 0.034), this did not recur during the second cycle, albeit there being a 3% increase of prescriptions between admission and discharge in 2022 (see [Table 1](#)).

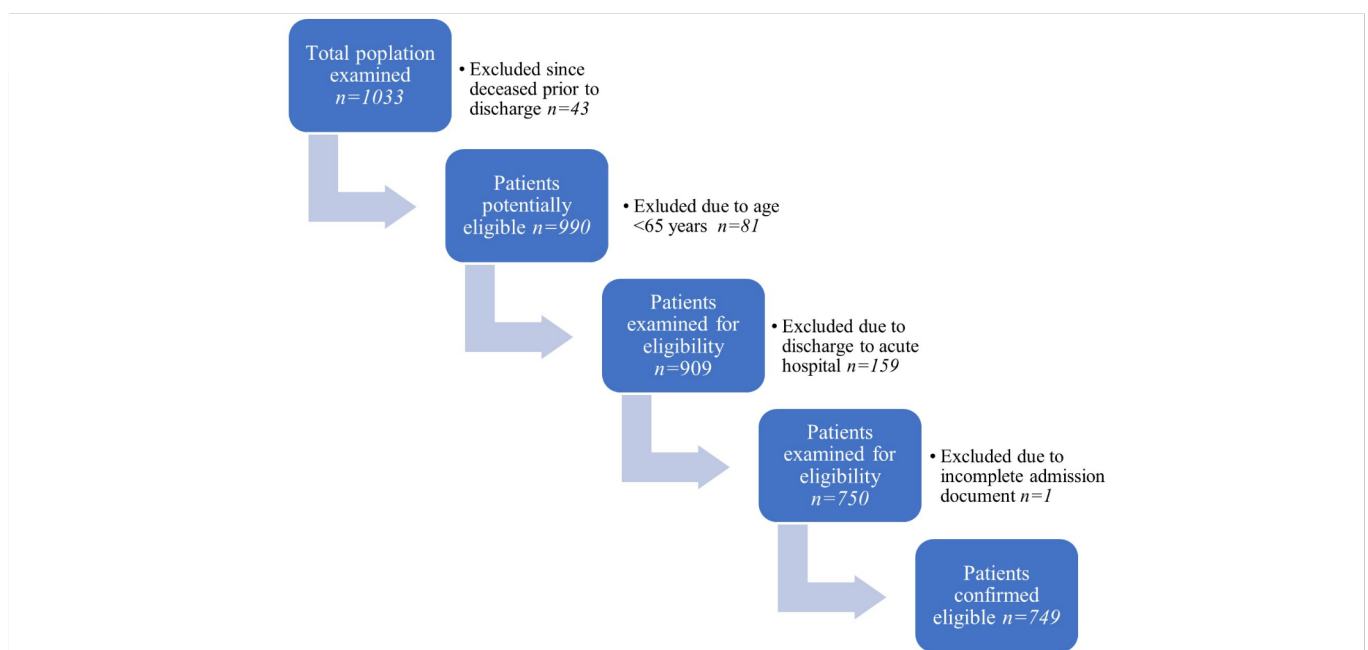


Figure 1 Patient selection process; n= number of patients

In 2022, from those admitted on treatment (109 patients), 39 patients (35.8%) had their dosage decreased or stopped completely; 7 (6.4%) had their dose increased; 63 (57.8%) underwent no treatment adjustment. From those not admitted on treatment (640 patients), 36 had treatment started from nil (5.6%) (see [Table 2](#)).

Of those discharged on either a benzodiazepine or a Z-drug, documentation of diagnosis improved significantly in 2022, with 55% having an adequate

discharge diagnosis documented compared to 43% in 2019 ($p = 0.046$) (see [Figure 2](#)). Out of the 60 patients in 2022 who did not have a diagnosis documented, 43 (71.6%) were prescribed hypnotics on a purely nocturnal basis.

Anxiety (22%), depression (18%), dementia (5%), alcohol misuse (5%) and insomnia (4%) were the most commonly reported in the re-audit. Throughout both cycles, lorazepam was the hypnotic most commonly prescribed, followed by bromazepam and diazepam. Other benzodiazepines or Z-drugs prescribed were: alprazolam, clonazepam, lormetazepam, mexazolam, nitrazepam or zolpidem. The vast majority of patients discharged on treatment had a well-documented history of fractures and/or falls in both audit cycles (see [Table 3](#)).

Table 2 Treatment (benzodiazepines and/or Z-drugs) changes from admission to discharge

	1 st cycle	2 nd cycle
Treatment load decreased^a	n=60 (40.5%)	n=39 (35.8%)
Treatment dose increased	n=11 (7.4%)	n=7 (6.4%)
Treatment started from nil	n=62 (7.8%)	n=36 (5.6%)
Treatment not adjusted	n=77 (52%)	n=63 (57.8%)

^aeither treatment dose was decreased or treatment was stopped completely prior to discharge; n= total number of patients

DISCUSSION

Prescribing practices did not improve significantly following our educational interventions. However, a few markers from our results might indicate a positive trend in deprescribing benzodiazepines and or Z-drugs. Overall, there was a 1.7% decrease in the proportion of patients discharged on either benzodiazepines and or Z-drugs when compared to the initial audit. Moreover, whilst unfortunately there was still an increased proportion of patients discharged versus admitted on treatment, this no longer reached a statistical significant increase in the 2nd cycle (see [Table 1](#)). This might indicate an improvement, albeit not a statistically significant one. In order to reach the final desired outcome of having less patients discharged on treatment when compared to admission, we evidently still require further intervention and quality improvement.

A scoping review by Neville et al which identified 43 relevant studies, showcased a broad variety of interventions used to reduce the prescription of sedatives in hospitalized patients. On comparing studies, it was found that there was little homogeneity in the kind of interventions used. Educational interventions were the most frequently employed, either alone; for example in the form of written educational bulletins or verbal lectures, or together with other multifaceted approaches. As a singular intervention, education was not deemed as successful as when combined with other

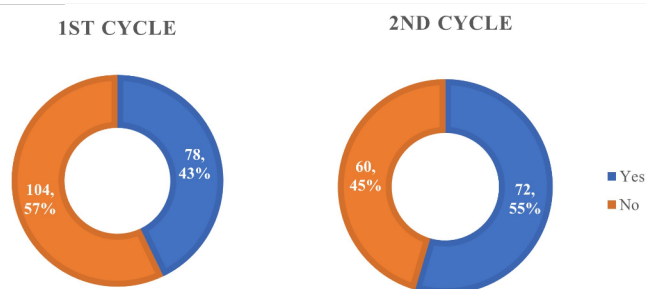


Figure 2 Comparison between 1st and 2nd cycle audit of number and percentage of patients discharged on benzodiazepines and/or Z-drugs with a documented prescription rationale

Table 3 History of falls/fractures in those discharged on treatment

	1 st cycle	2 nd cycle
History of fractures within last 2 years	n= 81 (44.3%)	n= 52 (39.4%)
History of fractures within last 10 years	n= 101 (55.2%)	n= 70 (53%)
History of falls	n= 121 (66.1%)	n= 101 (76.5%)

n=number of patients

interventions. Overall, sleep protocols and multifaceted interventions had the best outcomes.^{8,9}

The one area in which we have seen a statistically significant improvement is documentation of prescribing rationale. In 2022, 55% had a diagnosis stated. This is 12% more than when compared to 2019 ($p = 0.046$). From those who did not have a diagnosis documented, the vast majority (71.6%) had their hypnotic prescribed solely on a nocturnal basis. This likely indicates that they were primarily prescribed for their sedative effects. It is a well-known fact that hospitalised patients suffer from insomnia and there are reports that up to 50% of inpatients have reported such an ailment.¹⁰ Having better documentation of insomnia as a prescribing rationale will help policy makers understand the importance of introducing interventions such as sleep protocols and other non-pharmacological measures.

Limitations

No weight was given to failed trials of deprescribing or failed trials of alternative pharmacological or non-pharmacological treatment. We also did not evaluate for the presence of any other psychiatric treatment apart from benzodiazepines and Z-drugs. Whilst all efforts should be undertaken to avoid prescribing and to encourage deprescribing hypnotic sedatives, they remain a viable and important treatment option in some scenarios. In these cases, the potential risks have to be communicated to the patient and prescribing rationale has to be clearly documented. Long-term use should be highly discouraged.

CONCLUSION

Hypnotic sedative misuse and overuse remains a worldwide phenomenon. Whilst educational interventions may help with raising awareness, they are often not enough to instil change in prescribing and deprescribing practices. Multi-faceted and targeted interventions should be the focus of any future attempts of improving outcomes.

SUMMARY BOX

What is already known:

- It is strongly recommended that benzodiazepines and Z-drugs are avoided in older adults with a history of falls or fractures.
- The misuse and overuse of benzodiazepines and Z-drugs is a worldwide epidemic.
- The ongoing monitoring and evaluation of prescription practices are crucial in ensuring patient safety.

What are the new findings:

- A significant proportion of our patients are being discharged on benzodiazepines and/or Z-drugs.
- Educational interventions in this quality improvement project did not result in a significant improvement in prescribing practices.
- There has been a significant improvement in documentation of prescription rationale.
- Multi-faceted and targeted interventions should be the focus of any future attempts of improving outcomes.

REFERENCES

1. Woolcott JC, Richardson KJ, Wiens MO, et al. Meta-analysis of the impact of 9 medication classes on falls in elderly persons. *Archives of Internal Medicine* 2009; 169:(21) 1952–60.
2. Donnelly K. Benzodiazepines: Revisiting clinical issues in treating anxiety disorders. *Journal of Psychosocial Nursing and Mental Health Services* 2017; 55:(3) 17-20.
3. Fick, DM, Semla, TP, Beizer J, et al. 2019 American Geriatrics Society Beers Criteria® Update Expert Panel. American Geriatrics Society 2019 updated AGS Beers Criteria® for potentially inappropriate medication use in older adults. *Journal of the American Geriatrics Society* 2019; 67:(4) 674-694.
4. O'Mahony D, Cherubini A, Guiteras AR, et al. STOPP/START criteria for potentially inappropriate prescribing in older people: version 3. *Eur Geriatr Med* 2023; 14:(4)625-32.
5. Airagnes G, Pelissolo A, Lavallée M, Flament M, Limosin F. Benzodiazepine Misuse in the Elderly: Risk Factors, Consequences, and Management. *Curr Psychiatry Rep* 2016; 18:(10) 89.
6. Del Giorno R, Ottini A, Greco A, et al. Peer-pressure and overuse: The effect of a multimodal approach on variation in benzodiazepine prescriptions in a network of public hospitals. *Int J Clin Pract* 2020; 74 (3):e13448.
7. Massa L, Laybats F, Zehlicke, C. An audit assessing potentially inappropriate prescribing in the elderly with a history of falls or fractures. *European Geriatric Medicine* 2021; 12 (Suppl 1): S1-S387.
8. Neville HL, Granter C, Adibi P, Belliveau J, Isenor JE, Bowles SK. Interventions to reduce benzodiazepine and sedative-hypnotic drug use in acute care hospitals: A scoping review. *Res Social Adm Pharm* 2022; 18:(5) 2874-86.
9. Batty GM, Hooper R, Osborne CA, Jackson, SHD. Investigating intervention strategies to increase the appropriate use of benzodiazepines in elderly medical in-patients. *British Journal of Clinical Governance* 2001; 6:(4) 252-8.
10. Young JS, Bourgeois JA, Hilty DM, Hardin KA. Sleep in hospitalized medical patients, part 1: factors affecting sleep. *J Hosp Med*. 2008; 3:(6) 473-82.