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Original Research Article

A prospective analysis on drug usage and assessment of health-related quality of life in a medical intensive care unit at a tertiary care teaching hospital

Divya S. Bhat[1]*, Sathisha Aithal[2], Vimarsha U. K.[3]

Department of Pharmacology, K. V. G. Medical College and Hospital, Sullia, Karnataka, India

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***Correspondence:**
Dr. Divya S. Bhat,
Email: divya93431@gmail.com

ABSTRACT

Background: Drug use research is vital for evaluating prescribing trends and its impact on healthcare. Despite guidelines, intensive care unit (ICU) prescriptions often vary due to patient and prescriber related factors. Analyzing these patterns helps optimize therapy and identify drug related issues. The world health organization (WHO) ATC system enables standardized comparisons but may not reflect actual doses. The EQ-5D-5L questionnaire assesses health related quality of life (HRQoL) and treatment outcomes. This study evaluates of prescription pattern in medical ICU (MICU) and estimates HRQoL index.
Methods: A prospective cross-sectional study was conducted in MICU of KVGMCH, Sullia (March to August 2025) after ethical approval (KVGMCIEC202502). Eligible patients were included, excluding those with incomplete data or discharged against medical advice. Data on demographics, diagnosis, ICU stay, drug therapy, treatment outcome, ADRs, HRQoL was collected and descriptively analyzed using excel.
Results: Study included 102 patients with 68.62% male and 31.38% of females. Adults (18-64 years) accounted for 64.7%, while elderly (≥65 years) were 35.3%. Average drug count was 8.88 per patient, mainly administered intravenously (50.8%) followed by oral (34.9%). ICU stay ranged from 2-8 days on an average and a total of 906 drug were prescribed. Gastrointestinal, respiratory conditions being most common cause of admissions. ceftriaxone-sulbactam was most prescribed drug. Recovery rate was 92.2% and EQ-5D-5L scores improved from -0.923 to 0.897.
Conclusions: Analysis of case records revealed that prescribed drugs were despite high antibiotic usage, with improved EQ-5D-5L scores. Polypharmacy was unavoidable in ICU. However, single centre, small sample size, short duration, descriptive design limits its generalizability.

Keywords: Drug utilization, Polypharmacy, Health related quality of life

INTRODUCTION

Drug utilization research is defined as "A society's marketing, distribution, prescription, and use of drugs, with particular emphasis on the resulting medical, social, and economic consequences.[1]" This makes it a vital tool for studying the clinical use of drugs in the general population and its impact on the healthcare system.[2] Healthcare providers must administer the appropriate medications to the appropriate patients for the appropriate amount of time, depending on the clinical demand.[3] The WHO reports that more than 50% of medications are distributed and administered incorrectly. Patients who have comorbidities or are seriously unwell are admitted to ICUs.

The use of drugs in ICUs is governed by a number of regulations, although it may be challenging to follow them due to factors like resident learning curves, patient-specific

situations, and physician drug preferences.[4] Therefore, prescription pattern studies are essential for understanding drug use, trends, and patient outcomes. Drug-related problems, drug-drug interactions, drug accumulation and organ dysfunction, and sensitivity to drug reactions-all of which are more prevalent in ICU patients-are identified by these studies, which also help to enhance treatment standards. Drug use studies may influence prescription practices, ensuring appropriate pharmacotherapy and high-quality healthcare.[5]

The WHO collaborating center for drug statistics methodology created the anatomical therapeutic chemical (ATC) classification system, an Internationally recognized framework for grouping medications based on their chemical properties, therapeutic indication, and Anatomical site of action.[6] It serves as a foundation for studies on drug usage and comparisons of medication use in healthcare systems.[7] Pharmacoepidemiology, pharmacoeconomics, and public health, all make extensive use of the ATC system to track prescription trends, evaluate rational drug usage, and assess policy measures. Its methodical approach facilitates evidence-based decision-making in pharmacological practice and improves the interpretation of data on drug intake.[8]

HRQoL is the way that patients perceive how their critical illness and well being in the ICU affect their quality of life. Poor HRQoL among ICU survivors is a significant concern that has been linked to higher mortality, financial burden, and family caregiver burden. In fact, survivors who have better HRQoL tend to have lower levels of anxiety, depression, and post-traumatic stress disorder (PTSD). Over the years, researchers have been paying more attention to this issue, which has led to an increase in HRQoL research.[9] HRQoL includes the EQ-5D-5L (EuroQol 5 dimensions 5 levels) and VAS (Visual analogue scale) tools.[10] The EQ-5D-5L is a nonspecific disease assessment tool that evaluates mobility, self-care, regular activities, pain/discomfort, and anxiety/depression.

The VAS is a percentage scale with contrasting adjectives at either end, such as "worst health state" being 0% and "best health state" being 100%.[11] Patients mark a point in this range to represent their perceived state of health.[12] The VAS has become a crucial part of HRQoL assessment because of its ease of use, reliability, and cross-cultural application, particularly in patient-reported outcome studies and clinical pharmacology trials.

This aim of this study includes assessing drug prescription trends and evaluating the HRQoL index in the medical intensive care unit.

METHODS

Study setting

Study carried out at Medical intensive care unit, KVGMH, Sullia, India

Study design

It was a prospective study.

Study duration

Study conducted from March 2025 to August 2025.

Sample size

All eligible patients admitted over the duration of study.

The data was collected personally by the investigator from medical intensive care unit, KVG medical college and hospital.

Accordingly following data was collected: Patient demographic details (age, gender, address, IP number and department). Cause of admission, treatment protocol, duration of ICU stays, ADR if any and HRQoL was analyzed with EQ-5D- 5L, VAS questionnaire.

Statistical analysis

The data obtained was coded and entered to Microsoft excel spreadsheet, data was analyzed by SPSS v29 version and it was recorded as percentage, frequency, mean±standard deviation.

Inclusion criteria

Patients of age >18 years and any gender admitted in MICU were included in the study.

Exclusion criteria

Insufficient patient data and patients discharged against medical advice were excluded from the study.

Data collection and analysis

The data on demographic profile, diagnosis, duration of ICU stay, laboratory investigations, drug therapy, Overall outcome and adverse drug reactions if any mentioned in the case sheet was noted after obtaining the patient consent. To analyze HRQoL index, we used EQ-5D-5L VAS questionnaire at the time of admission and discharge. All the collected data was entered into Microsoft Excel worksheet and descriptive analysis was done.

Implications

Identification of risks associated with low safety margin drugs, potential drug- drug interactions, and effect of altered physiological status on drug therapy helps to evolve strategies to reduce therapeutic failure and improve patient safety. Encouragement of collaborative research involving physicians and clinical pharmacologists can foster better communication and more effective medication management.

Ethical considerations

Study was conducted after obtaining approval from the institutional ethics committee (KVGMCIEC202502).

RESULTS

A total of 102 patients were included in this study. The majority of patients were adults aged 18-64 years (n=66, 64.7%) and 36 patients (35.3%) were elderly, aged ≥65 years. With regards to gender distribution, males constituted the highest proportion with n=70 (68.62%) and females were 32 patients (31.38%) as shown in Table 1.

Table 1: Demographic data.

Variables	Categories	Total patients (%)
Age (in years)	Adults (18-64)	66 (64.7)
	Elderly (≥65)	36 (35.3)
Gender	Male	70 (68.62)
	Female	32 (31.38)

The duration of stay ranged from 2 to 8 days, with mean of 4.17±1.44 days and a median of 4 days. More than half the patients (n=56/102; 54.9%) required 4-5 days of treatment in the ICU. Short duration (2-3 days) accounted for 31.4%, while a prolonged treatment of more than 6 days was required in 13.7% patients. A total of 906 drugs were prescribed to 102 patients with an average of 8.88 drugs per patient. The intravenous (IV) route was the most frequently used route of drug administration accounting for 460 administrations (50.8%). This was followed by oral route with 316 administrations (34.9%), nebulization contributed to 66 administrations (7.3%), while subcutaneous route accounted for 30 administrations (3.3%). The intramuscular route was the least utilized with only 4 administrations (0.4%).

Based on the ATC system as shown in Table 2, the 906 prescribed drugs were distributed across eight major therapeutic categories as shown. The alimentary tract and metabolism (ATC-A) group included drugs like rifaximin, ursodeoxycholic acid, metformin, glimiperide, insulin preparations, thiamine and oral rehydration solution. The blood and blood forming organs (ATC-B) group, comprised of tranexamic acid, vitamin K, clopidogrel and mannitol. Drugs for cardiovascular system (ATC-C) included dobutamine, atorvastatin, furosemide and glyceryl trinitrate. Systemic hormonal preparations (ATC-H), constituted prednisolone. The anti-infective agents for systemic use (ATC-J) group included ceftriaxone, sulbactum, meropenem and piperacillin-tazobactum. The central nervous system (ATC-N) included citicoline, piracetam and lorazepam. The antiparasitic group (ATC-P) included metronidazole. Lastly, the respiratory system (ATC-R) group included levosalbutamol, ipratropium bromide, budesonide, deriphylline, N-acetyl cysteine.

Table 2: ATC classification.

ATC		Drugs
A	Alimentary tract and metabolism	Rifaximin (a07aa1d), ursodeoxycholic acid (a05aa02), thiamine (a11da01), liveril forte (a05ba), glycerol (a06ax01), glargin insulin (a01ae04), metformin (a10ba02)+glimiperide (a10bb12), sodium bicarbonate (a16ax01), liquid paraffin (a06aa01), milk magnesia (a06ab02)
B	Blood and blood forming organs	Tranexamic acid (b02aa02), vitamin k (b02ba01), clopidogrel (b01ac04), ecospirin (b01ac06), mannitol (b05bc01)
C	Cardiovascular system	Dobutamine (c01ca07), atorvastatin (c10aa05), furosemide (c03ca01), glyceryl trinitrate (c01da02)
H	Systemic hormonal prep, excluding sex hormones	Prednisalone (h02ab06)
J	General anti infective for systemic use	Ceftriaxone (j01dd04)-sulbactum (j01cg01), meropenem (j01dh02), piperacillin+tazobactum (j01cr05)
N	Nervous system	Citicoline (n06bx06)-piracetam (n06bx03), lorazepam (no5ba06)
P	Anti parasitic products	Metronidazole (p01ab01)
R	Respiratory system	Levosalbutamol (r03ac1b), ipratropium bromide (r03bb01), deriphylline (r03da04), budesonide (r03ba02), n- acetyl cysteine (r05cb06)

The cause of admission was predominantly due to gastrointestinal disorders (22%), followed by respiratory system (20%) and hematological disorders were least frequent (2%) with rest as shown in Figure 1.

Most commonly prescribed drug-ceftriaxone+sulbactum followed by levosalbutamol+ipratropium bromide for treatment other than supportive therapy. The treatment outcome showed 92.2% recovery and 7.8% mortality.

The EQ-5D-5L scores demonstrated a marked improvement in patient's health status from admission to discharge. At admission, the EQ-5D-5L index value was 0.22 (78.43%) and -0.923 (21.57%) indicating poor health status, thereby reflecting a considerable impairment in the multiple domains of the questionnaire. At discharge, the score was increased to 0.89 (74.50%) indicating improvement in health status and better perceived quality of life. The shift in the distribution of patients at the time

of discharge showing fewer patients in negative or low score and higher patients in high score range highlights the positive impact of treatment as shown in Figure 2. According to VAS there was 60% improvement in the health at the time of discharge. Overall, the HRQoL Index shows a meaningful improvement in the quality of life of the patients.

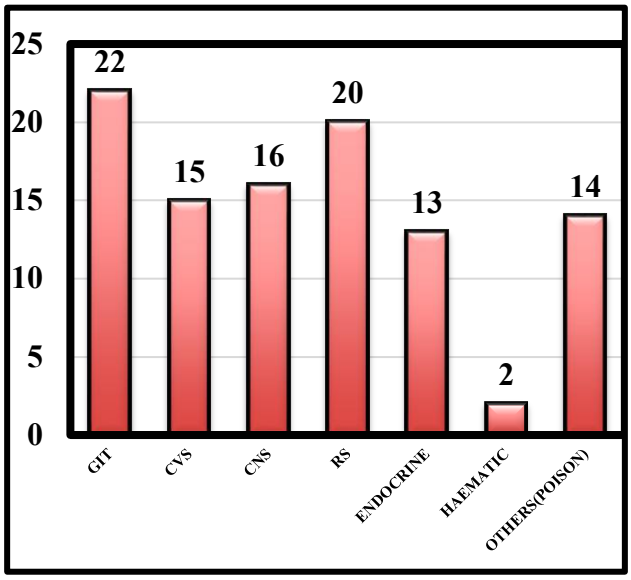

Figure 1: Distribution of admissions by organ system.

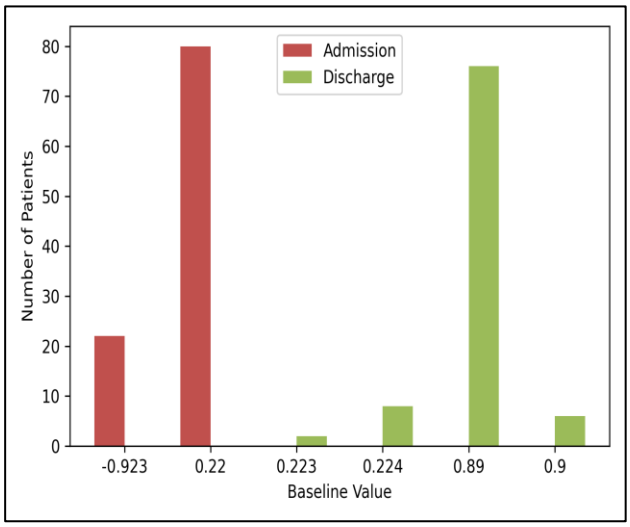

Figure 2: Distribution of baseline values of EQ-5D-5L scores at admission and discharge.

Both EQ-5D-5L and VAS scores demonstrated a positive linear association between admission and discharge values as shown in Figure 3 and 4. Lower health status at admission with subsequent improvement at the time of discharge indicated an improvement in the quality of life following the treatment in the ICU. The upward linear trends observed in both measures suggest concordant improvements in objective health-related quality of life (EQ-5D-5L) and subjective self-rated health (VAS).

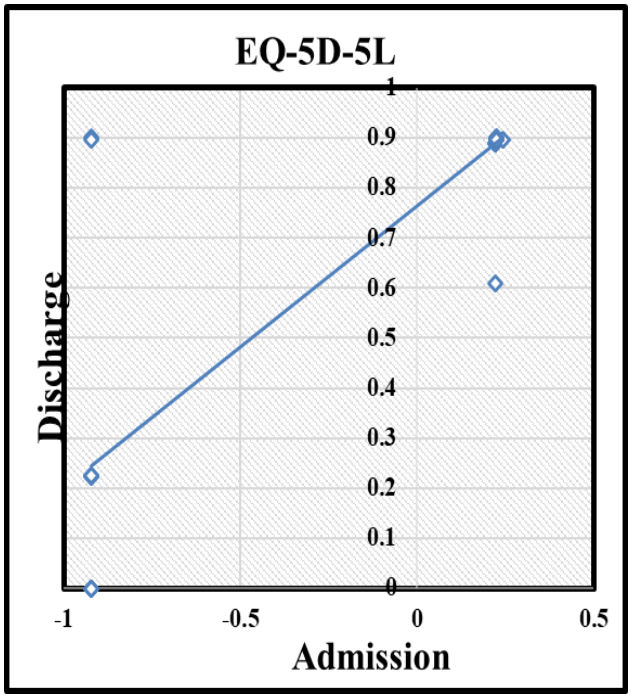

Figure 3: EQ-5D-5L.

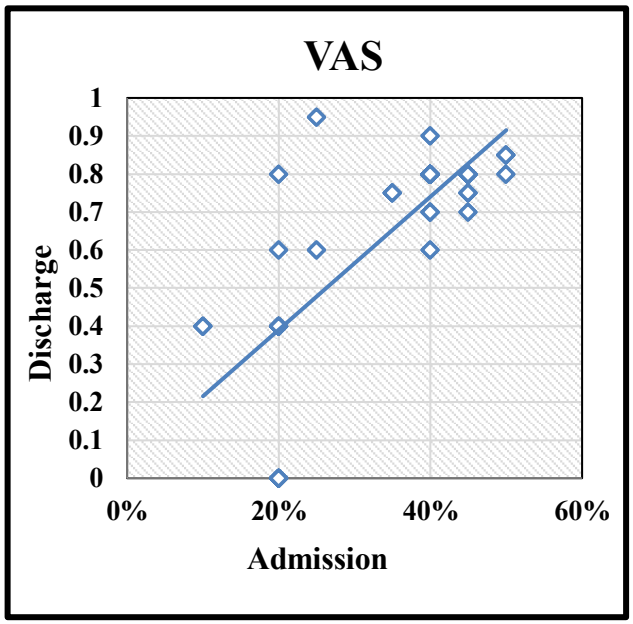

Figure 4: VAS.

DISCUSSION

This prospective study assessed drug utilization pattern and health-related quality of life among patients admitted to a MICU of a tertiary care teaching hospital. Males constituted the majority of admissions (68.62%), and females were 31.38%. Adults aged 18-64 years accounted for 64.7% of the study population. The mean duration of ICU stay was 4.17±1.44 days, indicating moderate disease severity and requiring short term intensive management, this was in accordance with previous studies.[13-15]

Polypharmacy was prominent with 906 drugs prescribed to 102 patients (mean of 8.88 drugs per patient), a pattern commonly observed in critical care due to disease complexity and supportive therapy requirement, this was comparable to previous studies by Jhaveri et al.[16] Intravenous administration was the predominant route of drug delivery **(**50.8%**)**, highlighting the clinical requirement for rapid therapeutic action, predictable bioavailability in acutely ill and hospitalized patients requiring immediate stabilization which was coinciding with similar study.[17]

Anti-infective agents for systemic use was the most frequently prescribed therapeutic drug class, with ceftriaxone-sulbactum as the most commonly utilized antibiotic which was similar to previous study conducted in Maharashtra.[18] The widespread use of this combination can be attributed to its broad spectrum antimicrobial coverage and effectiveness against common pathogens. This prescription pattern closely paralleled the principal causes of hospital admission notably, gastrointestinal (22%) and respiratory disorders (20%) where infection is the main etiological agent.

Furthermore, medications targeting the respiratory system were prescribed extensively, particularly bronchodilators such as levosalbutamol and ipratropium bromide, reflecting the high burden of respiratory morbidity in the study population. Overall, the prescribing pattern demonstrated a high degree of clinical appropriateness and rationality with drug selection closely aligned to disease severity, therapeutic indications and standard treatment protocols, thereby supporting effective and evidence based inpatient pharmacotherapy. Clinical outcome was favorable, with a recovery rate of 92.2% and a mortality rate of 7.8%.

HRQoL improved substantially over the course of hospitalization. At the time of admission, EQ-5D-5L index values indicated a compromised health status, indicating significant symptom burden and functional limitation experienced by patients. At the time of discharge, the index value demonstrated a pronounced improvement of 74.50% (0.89), suggesting a meaningful recovery in the overall health status following inpatient management as also seen in previous study.[19]

In parallel with the improvement in EQ-5D-5L Index values, VAS scores demonstrated a substantial enhancement with an approximate of 60% increase in health status at the time of discharge as perceived by the patient. Importantly, a positive linear association was observed between admission and discharge values for both EQ-5D-5L and VAS scores, indicating that patients with poorer baseline health experienced proportionate improvement during hospitalization. This overall improvement in health status also highlights the rationality of drug use that impacted the quality of life of the patients admitted in the ICU.

CONCLUSION

Reflecting the complexity and severity of disease among critically ill patients, this prospective study focuses on logical evidence-based drug utilization methods in MICU of a tertiary care teaching hospital. The demand for quick therapeutic action and all-encompassing supportive care was met by polypharmacy and preponderance of intravenous drug administration. The main stay of treatment was anti-infective drugs, especially broad-spectrum antibiotics, which closely reflected the main reasons for admissions, which were primarily respiratory and gastrointestinal conditions. A high recovery rate and an acceptable mortality rate were attained, despite inherent difficulties in caring the critically ill patients. The EQ-5D-5L index and EQ-VAS Scores significantly improved from admission to discharge, indicating that inpatient intensive care unit treatment lead to significant and clinically relevant improvement in “HRQoL”. These results highlight the value of interdisciplinary critical care and tailored medication in enhancing patient-reported outcomes and survival for patients. However, causal inference and generalizability are constrained by the descriptive analysis, limited sample size, short duration and single-center design. More extensive multicenter research using inferential statistical methods is advised to support these results.

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Ethical approval: The study was approved by the Institutional Ethics Committee KVGMCIEC202502.

REFERENCES

1. Mittal N, Verma M, Siwach S, Bansal P, Singhal SK. Drug Utilization Research and Predictors of Outcomes in the Intensive Care Unit of a Tertiary Care Hospital: A Prospective Observational Study. Cureus. 2023;15(12):e50653.
2. Shankar PR, Upadhyay DK, Subish P, Bhandari RB, Das B. Drug utilisation among older inpatients in a teaching hospital in Western Nepal. Singapore Med J. 2010;51(1):28.
3. Anusha S. Drug prescription pattern in a medical ICU of a tertiary care teaching hospital in Tamil Nadu. Coronary artery disease. 2024;21:29.
4. Bobek MB, Hoffman-Hogg L, Bair N, Slomka J, Mion LC, Arroliga AC. Utilization patterns, relative costs, and length of stay following adoption of MICU sedation guidelines. Formulary. 2001;36(9):664.
5. Qutub-E-Alam SM, Kubasad NI, Saathvika T, Ahmed N, Jayappa MK. Assessment and evaluation of prescribing pattern among the patients admitted in the

intensive care unit. World J Pharm Res. 2024;13(11):2045-71.
6. Hollingworth S, Kairuz T. Measuring medicine use: applying ATC/DDD methodology to real-world data. Pharmacy. 2021;9(1):60.
7. Wettermark B, Elseviers M, Mueller T, Almarsdottir A, Benkő R, Bennie M, et al. Introduction to drug utilization researchin Drug Utilization Research. John Wiley and Sons, Ltd. 2024;1-3.
8. Rønning M, Salvesen Blix H, Tange Harbø B, Strøm H. Different versions of the anatomical therapeutic chemical classification system and the defined daily dose–are drug utilisation data comparable? Europ J Clin Pharmacol. 2000;56(9):723-7.
9. Li Y, Fang D, Wu Q. Health-related quality of life among critically ill patients after discharge from the ICU-A systematic review protocol. Plos One. 2023;18(8):e0278800.
10. Group TE. EuroQol-a new facility for the measurement of health-related quality of life. Health policy. 1990;16(3):199-208.
11. Gift AG. Visual analogue scales: measurement of subjective phenomena. Nursing Re. 1989;38(5):286-7.
12. Wewers ME, Lowe NK. A critical review of visual analogue scales in the measurement of clinical phenomena. Res Nursing Health. 1990;13(4):227-36.
13. Patel MK, Barvaliya MJ, Patel TK, Tripathi CB. Drug utilization pattern in critical care unit in a tertiary care teaching hospital in India. Int J Crit Illn Inj Sci. 2013;3(4):250-5.
14. John LJ, Devi P, John J, Guido S. Drug utilization study of antimicrobial agents in medical intensive care unit of a tertiary care hospital. Asian J Pharm Clin Res. 2011;4(2):81-4.
15. Williams A, Mathai AS, Phillips AS. Antibiotic prescription patterns at admission into a tertiary level intensive care unit in Northern India. J Pharm Bioall Sci. 2011;3:531-6.
16. Jhaveri BN, Patel TK, Barvaliya MJ, Tripathi CB. Drug utilization pattern and pharmacoeconomic analysis in geriatric medical in-patients of a tertiary care hospital of India. J Pharmacol Pharmacotherapeut. 2014;5(1):15-20.
17. Patanaik SK, Pattanayak C, Prasad A, Chauhan AS. Drug utilization pattern in an intensive care unit setting in Eastern India. Int J Basic Clin Pharmacol. 2015;4(6):1136-41.
18. Shinde RM, Kale A, Chube S, Sawant M. Drug utilization study in medical intensive care unit in a rural tertiary care teaching hospital in Maharashtra. Int J Med Sci Public Health. 2017;6:1.
19. Golicki D, Niewada M, Karlińska A, Buczek J, Kobayashi A, Janssen MF, Pickard AS. Comparing responsiveness of the EQ-5D-5L, EQ-5D-3L and EQ VAS in stroke patients. Quality Life Res. 2015;24(6):1555-63.

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