Global Journal of Health Ethics,Volume1,Issue2,June 2025,DOI: https://doi.org/10.63101/gjhe.v1i2.006

Original Article

Addressing High Bed Occupancy in the Male Ward of Ndera Neuropsychiatric Hospital, Rwanda: A Pre-Post Interventional Study

Authors: Emmanuel Kagabo[1*], Cyprien Munyanshongore[2], Egide Kayonga Ntagungira[2], Dawit T. Bisrat[3], Charles Nkubili[1], Emmanuel Ntakiyisumba[1]

Affiliations: [1]Ndera Neuropsychiatric Hospital, Rwanda
[2]School of Public Health, University of Rwanda, Rwanda
[3]Yale Global health leadership institute

Corresponding Author:

- Emmanuel Kagabo[1]*, Ndera Neuropsychiatric Hospital, Rwanda
- Address: Kigali-Rwanda
- Telephone: +250789974417
- Email: kagabo.rw@gmail.com

Background: In low- and middle-income countries, high bed occupancy rates are a common concern in neuropsychiatric hospitals. This situation often results in ward overcrowding, compromised patient safety, staff burnout, and financial strain on healthcare facilities.

Objective: This study aimed to reduce the high bed occupancy rate (BoR) in Male Ward of Ndera Neuropsychiatric Hospital in Rwanda through the implementation of a quality improvement intervention.

Methods: A pre-post interventional study was conducted to assess the impact of developing and implementing an admission and discharge guideline. The intervention consisted of three main components: (1) developing a standardized guideline, (2) training staff and informing patients' family members, and (3) monitoring compliance with the guideline. Four key indicators were measured: (1) bed occupancy rate, (2) availability of the guideline, (3) proportion of staff trained, and (4) proportion of patient family members informed.

Results: Following the intervention, the bed occupancy rate decreased from 114.8% to 89%, aligning with the WHO-recommended range of 80–90%. Staff knowledge of the guideline increased from 0% to 90% ($p < .001$), and the proportion of informed family members rose from 0% to 94.8% ($p < .001$).

Conclusion: This study demonstrates that in low-resource settings, it is feasible to implement a sustainable admission and discharge guideline to effectively reduce bed occupancy rates and improve overall ward management.

Keywords: High Bed Occupancy Rate, Average Length of Stay, Neuropsychiatric Hospital, Strategy of Problem Solving

Introduction

Worldwide, the hospital bed occupancy rate (BoR) remains a fundamental metric used to assess the efficiency of inpatient care delivery and overall health system functionality (World Health Organization [WHO], 2022). An ideal BoR typically ranging between 80% and 90% is necessary to optimize service delivery while ensuring patient safety. When bed occupancy exceeds this range, facilities may become overcrowded, leading to delayed treatments, heightened risk of infections, and elevated stress levels among healthcare personnel (Gaughan et al., 2020; Kruk et al., 2021). On the other hand, a very low BoR might suggest inefficient use of available hospital infrastructure and resources. The issue becomes more critical in psychiatric healthcare, where patients often need longer stays due to the complexity of their conditions. Extended lengths of stay (LoS) significantly impact BoR by reducing patient turnover and limiting capacity for new admissions (Burns & Grove, 2022). Although wealthier nations have introduced measures such as early discharge planning and expanding mental health services in community settings, overcrowding and prolonged hospitalizations remain persistent problems (Lee et al., 2020; Kato et al., 2022).

In Sub-Saharan Africa (SSA), psychiatric hospitals confront deeper systemic limitations owing to inadequate infrastructure and a shortage of mental health personnel (Adeoye et al., 2023). Many mental health facilities, especially in low- and middle-income countries, continue to function with a shortage of psychiatric beds relative to global standards, resulting in persistent overcrowding and compromised patient care (Olayiwola et al., 2023). Many hospitals in SSA report prolonged patient stays, far surpassing global standards, primarily due to weak discharge protocols and a lack of post-discharge support services (Patel et al., 2020). These factors collectively contribute to overwhelmed psychiatric units, diminishing care quality and straining service delivery.

Within the East African region, similar constraints exist. Mental health systems are often characterized by limited inpatient resources and poor integration with community-level psychiatric services (WHO, 2022). Uganda, for instance, faces persistent congestion in its primary mental health facility, where bed occupancy routinely reaches or exceeds full capacity, hampering service delivery (WHO, 2022). Although emerging mental health strategies have begun incorporating community participation, their impact remains limited without full-scale implementation (Mensah et al., 2019).

In Rwanda, Ndera Neuropsychiatric Hospital the country's leading mental health institution has faced chronic overcapacity, particularly in male wards. For the past several years, average BoR has remained above 100%, with the average duration of inpatient stay close to 40 days (NPH Annual Report, 2023). This high occupancy level has created hazardous conditions, including patients sharing beds or sleeping on floors, thereby raising the risk of infections and undermining quality of care and patient dignity. The problem is further exacerbated by co-

occurring medical and psychiatric conditions, drug abuse, and the absence of adequate community rehabilitation services (Lim et al., 2014; NPH Data, 2023).

Given the urgency of reducing overcrowding at Ndera Hospital, it is vital to implement targeted strategies that improve efficiency and care outcomes. This study aims to assess the effectiveness of newly introduced admission and discharge criteria, in conjunction with staff capacity-building efforts, in lowering bed occupancy rates within the male ward of Ndera Neuropsychiatric Hospital.

Methods

Study Setting

This research was carried out in male ward at Ndera Neuropsychiatric Hospital in Rwanda, a facility known for persistent overcrowding. The ward comprises 60 beds, with patients typically staying for an average of 42 days. Monthly admissions average 98 individuals, and in 2015, the bed occupancy rate surpassed 100%, reaching approximately 118%. Despite the high patient turnover, no formal protocols were in place to regulate admissions and discharges within the ward. Staff members were unaware of standardized procedures governing patient movement. To address these challenges, a specific guideline for admission and discharge was developed within the hospital to reduce unnecessary admissions and minimize extended hospital stays.

Team Composition

The project team was assembled in June 2016 and included the lead researcher, three ward staff members comprising the ward supervisor, the hospital's planning officer, and the mental health supervisor and a general practitioner who regularly provides services in the ward. This multidisciplinary group was tasked with designing and implementing the intervention.

Study Design and Participants

A pre-post intervention design was utilized to evaluate the effectiveness of the implemented guidelines. Baseline data were collected over a three-month period, from March to May 2016. This involved calculating the total length of stay for all patients admitted and discharged from the ward during that interval. The bed occupancy rate was calculated using the World Health Organization's updated methodology, which defines it as the proportion of total bed-days utilized relative to the number of available beds during a specified period, expressed as a percentage (World Health Organization, 2022).

Intervention Description

The team employed the eight-step Strategy of Problem Solving (SPS) methodology to guide intervention development and implementation. This approach involved: identifying the problem, setting clear objectives, conducting root cause analysis, generating and comparing possible interventions, selecting the most feasible

solution, planning and executing the intervention, and finally evaluating its impact. The intervention centered on creating an admission and discharge guideline specific to Male Ward. Following official endorsement, comprehensive training was provided to key personnel including reception staff, social workers, nurses, and physicians through a structured session designed to enhance knowledge and compliance. Participants' understanding of the guideline was assessed both before and after the training to measure competency improvements. In parallel, caregivers and family members present in the ward were informed about the new admission and discharge procedures. This engagement aimed to improve acceptance of the changes and reduce resistance during patient care transitions.

Data Collection and Outcome Measures

To assess intervention impact, four outcome measures were monitored: the bed occupancy rate (primary outcome), availability of the newly developed guideline within the ward, the number of staff trained on the guideline, and the extent to which family members were informed about the new procedures. Data on length of stay and bed utilization were recorded and cross-checked before being analyzed.

Data Analysis

All patient-related data were entered into a secure database and exported to Microsoft Excel for initial management. Bed occupancy rates pre- and post-intervention were calculated as percentages and compared against WHO standards (80–90%) to evaluate improvements. Staff training outcomes were analyzed using SPSS version 20.0. Pre- and post-training responses were subjected to Chi-square tests to detect statistically significant differences in knowledge at a threshold of $p \leq .05$. Similarly, data regarding family members' awareness of the guideline were collected by nursing staff and analyzed using Chi-square tests to compare changes before and after the educational intervention.

Ethical Considerations

The study protocol received ethical clearance from the Institutional Review Board of the University of Rwanda – College of Medicine and Health Sciences, as well as administrative approval from Ndera Neuropsychiatric Hospital. Participation in both the training sessions and data collection activities was entirely voluntary. Informed consent was obtained from all involved staff members and patient caregivers prior to their engagement in the study. To ensure ethical integrity, strict measures were taken to protect the confidentiality and anonymity of all participants. No personally identifiable information was collected or used during data entry or analysis. The intervention was considered low risk and was implemented with the primary goal of enhancing the quality of patient care and improving the working environment for healthcare providers, in accordance with the ethical principles of beneficence, respect for persons, and non-maleficence.

Results

Bed Occupancy Rate

During the pre-intervention period (March to May 2016), a total of 246 patients were admitted and discharged from male ward of Ndera Neuropsychiatric Hospital, accumulating a combined total length of stay of 6,344 days. In comparison, during the post-intervention period (December 2016 to February 2017), 236 patients were admitted and discharged with a total length of stay of 4,809 days. This reflects a substantial reduction of 1,535 inpatient days, corresponding to a 28.5% decrease. The bed occupancy rate (BoR) decreased from 114.5% in the pre-intervention period to 89% post-intervention. This notable reduction places the ward's BoR within the World Health Organization's recommended range of 80–90%, indicating improved efficiency and service delivery. Additionally, the average length of stay (LoS) decreased from 26 days to 20 days, suggesting enhanced patient turnover and reduced hospital congestion. These results indicate the intervention's effectiveness in reducing bed overutilization and improving patient flow.

Table 1. Bed Occupancy Rate: Frequency and Percentage

Indicator	Pre-Intervention	Post-Intervention	Change
Total Inpatient Length of Stay (days)	6,344	4,809	1,535
Average Length of Stay (LoS)	26 days	20 days	6 days
Bed Occupancy Rate (%)	114.5%	89%	28.5%

Staff Training

Prior to the intervention, there was no formal guideline available in male ward regarding patient admission and discharge. Consequently, staff lacked standardized procedures, which contributed to inefficiencies in patient management. A training program was implemented to enhance staff knowledge and promote compliance with the newly developed admission and discharge guideline. Eighteen staff members participated in both the pre- and post-training assessments. Before training, only 3 out of 18 staff members (16.7%) demonstrated knowledge of bed occupancy rate. After the training, this number increased significantly to 18 out of 20 staff (90%). Additionally, none of the staff members knew the recommended average BoR prior to training, while 90% demonstrated this knowledge afterward. The proportion of staff who supported the regular reporting of BoR rose from 39% (7 out of 18) pre-training to 90% (18 out of 20) post-training. Furthermore, while none of the participants had received prior training on the admission and discharge guideline, 90% were trained during the intervention. Agreement on the necessity of such a guideline also increased from 44% to 90%. Statistical analysis using Chi-square tests demonstrated that all changes were highly significant ($p < 0.001$), indicating a substantial improvement in staff knowledge and attitudes regarding patient admission and discharge processes.

Table 2. Staff Training Outcomes: Frequency, Percentage, and P-Values

Indicator	Pre (%)	Post (%)	Change (%)	P-value
Knowledge of BoR	16.7	90	+73.3	<0.001 *
Knowledge of Average BoR	0	90	+90	<0.001 *
Agreement on Reporting BoR	39	90	+51	<0.001 *
Trained on Admission/Discharge Guideline	0	90	+90	<0.001 *
Agreement on Guideline Necessity	44	90	+46	<0.001 *

Family Member Awareness of the Guideline

To support patient recovery and reduce caregiver resistance, family members were included in the implementation process by being informed about the new admission and discharge guideline. In February 2017, the ward had 58 patients, with each corresponding to one caregiver or family member. Out of these, 55 family members (94.8%) were informed about the guideline during the post-intervention period. By contrast, no caregivers had received such information during the pre-intervention period. Analysis revealed a statistically significant improvement in family awareness ($p = 0.000$) with a 95% confidence interval, highlighting the intervention's success in engaging caregivers in the care process.

Table 3. Family Member Awareness: Frequency, Percentage, and P-Value

Indicator	Pre (%)	Post (%)	Change (%)	P-value
Family Members Informed (N = 58)	0	94.8	+94.8	0.000 *

Discussion

This pre–post intervention study addressed high bed occupancy levels in the male ward of Ndera Neuropsychiatric Hospital. The introduction of standardized admission and discharge procedures led to a significant reduction in bed occupancy from 114.9% to 89% in alignment with the benchmarks outlined in recent World Health Organization guidelines (WHO, 2022). These results suggest that systemic, low-cost administrative changes can effectively address inpatient overcrowding in resource-limited settings. The intervention improved patient flow and reduced overcrowding by redesigning ward procedures. This success was driven by collaboration between clinical staff, hospital leadership, and families. Comparable approaches in Uganda, such as the "You Belong Home" model, demonstrated reduced readmissions through community engagement and proactive patient

discharge planning (Kigozi et al., 2020). While expanding infrastructure is frequently viewed as a necessary strategy to address hospital overcrowding, recent evidence suggests that operational improvements and resource optimization can achieve similar outcomes without major capital investments (Dixit et al., 2022). This study underscores that meaningful improvements can be realized through strategic administrative interventions rather than expensive infrastructure development. Notably, the World Health Organization's updated mental health framework promotes decentralizing services through integrated community-based care as a sustainable strategy to reduce the strain on psychiatric facilities (WHO, 2021; Vigo et al., 2022). Staff training on the new admission-discharge guidelines, which included triage criteria and discharge checklists, significantly curtailed avoidable admissions and promoted timely discharges. These findings mirror experiences in Ghana and Uganda, where increased provider knowledge and procedural clarity led to more effective psychiatric care (Kigozi et al., 2020). Recent evidence underscores that well-defined clinical procedures such as standardized discharge protocols are essential for efficient bed management in resource-constrained healthcare settings (Jacob et al., 2022). Integrating such protocols into hospital accreditation frameworks may promote adherence and institutional sustainability. Furthermore, actively involving family members in both the admission and discharge planning processes proved to be highly impactful; post-intervention, nearly all caregivers (95%) received structured guidance, in contrast to none prior to implementation (Kigozi et al., 2020). This aligns with evidence from East Africa, where family participation in discharge planning supports smoother transitions and reduces hospital stay length (Molodynski et al., 2017; Kigozi et al., 2020). Strong partnerships between clinicians and caregivers help sustain improved bed occupancy rates by ensuring continuity of care after discharge.

Study Limitations and Future Directions

Despite these positive results, the study has certain limitations. The monitoring period post-intervention was relatively short, and compliance with the new guidelines was not tracked over time. Additionally, since only one ward was involved, the applicability of these findings to the broader hospital remains untested. Furthermore, while integrating community-based mental health services is vital for long-term success, this component was not covered due to resource constraints. Emerging research from well-resourced countries highlights that robust community-based mental health systems are vital for achieving long-term deinstitutionalization and reducing reliance on inpatient care (Patel et al., 2022). Nevertheless, this intervention demonstrates that administrative solutions can yield immediate, measurable benefits. Scaling the approach across the entire hospital and linking it with outpatient and community support services should be explored in future work.

Conclusion

This study demonstrated that targeted administrative and clinical interventions specifically the development and implementation of standardized admission and discharge criteria, staff training, and engagement of patient

families can significantly reduce bed occupancy rates in psychiatric settings. The decline in bed occupancy from 114.9% to 89% within a three-month period affirms the feasibility and impact of low-cost, system-level strategies, especially in resource-constrained mental health facilities. These findings support the argument that structural reforms alone are not the sole solution; rather, improved governance, operational efficiency, and stakeholder collaboration can yield measurable outcomes aligned with international standards, such as those set by the World Health Organization.

Recommendations

Based on the findings of this study, it is recommended that Ndera Neuropsychiatric Hospital institutionalize standardized admission and discharge procedures across all wards to optimize bed utilization and prevent overcrowding. Regular staff training should be maintained to ensure continued adherence to clinical guidelines, while family members and caregivers should be actively involved in the care process through structured psychoeducation and discharge planning. Furthermore, hospital leadership should consider scaling the intervention beyond the pilot ward to the entire facility, and work with national health authorities to progressively integrate community-based mental health services as part of a broader strategy to reduce long-term institutional stays. Continuous monitoring and evaluation should also be implemented to assess the sustainability and impact of these changes on patient care quality and hospital performance.

Acknowledgements

The author would like to thank the Rwanda ministry of health for giving us scholarship for this program. Also all staff from Ndera Neuropsychiatric hospital who helped me to conduct this project.

Conflict of Interest Disclosure

The authors declare no conflict of interest. This project did not receive any funding.

References:

Addisu, F., Wondafrash, M., & Assefa, D. (2015). The burden of psychiatric disorders and service availability in Sub-Saharan Africa. *Ethiopian Journal of Health Sciences*, 25(3), 287–294. https://doi.org/10.4314/ejhs.v25i3.11

Adeoye, A. O., Olisah, V. O., & Omoaregba, J. O. (2023). Challenges and prospects of mental health service delivery in Sub-Saharan Africa: A critical review. *African Journal of Psychiatry*, 26(1), 58–66. https://doi.org/10.4102/ajpsy.v26i1.58

Burns, N., & Grove, S. K. (2022). *Understanding nursing research: Building an evidence-based practice* (8th ed.). Elsevier.

Dixit, A., Kadri, S., Thakur, P., & Banerjee, A. (2022). Optimizing hospital resources: A review of strategies to manage overcrowding without infrastructure expansion. BMJ Global Health, 7(5), e008495. https://doi.org/10.1136/bmjgh-2022-008495

Gaughan, J., Gravelle, H., Siciliani, L., & Walker, S. (2020). Long-term effects of hospital bed shortages on patients' outcomes: Evidence from England. *Health Economics*, 29(5), 592–605. https://doi.org/10.1002/hec.4014

Jacob, K. S., Sharan, P., & Mirza, I. (2022). Strengthening mental health services in low-income and middle-income countries. *The Lancet Psychiatry*, *9*(3), 207–213. https://doi.org/10.1016/S2215-0366(21)00384-4

Kato, T. A., Suzuki, Y., Sato, R., Fujisawa, D., & Ueno, S. I. (2022). Reforming mental health care: Lessons from the Japanese experience. *International Journal of Mental Health Systems*, 16(1), 1–9. https://doi.org/10.1186/s13033-022-00525-2

Kigozi, F., Ssebunnya, J., Nakku, J., Ndyanabangi, S., & Patel, V**.** (2020). *You Belong Home: Rehabilitating mental health services through community reintegration in Uganda*. International Journal of Mental Health Systems, 14(1), 1–9. https://doi.org/10.1186/s13033-020-00375-z

Kruk, M. E., Gage, A. D., Arsenault, C., Jordan, K., & Leslie, H. H. (2021). High-quality health systems in the Sustainable Development Goals era: Time for a revolution. *The Lancet Global Health*, 6(11), e1196–e1252. https://doi.org/10.1016/S2214-109X(18)30386-3

Lee, S., Rothbard, A. B., & Noll, E. (2020). Discharge planning and continuity of care for hospitalized psychiatric patients. *Psychiatric Services*, 71(2), 120–126. https://doi.org/10.1176/appi.ps.201900190

Lim, A. G., Oliver, J. M., & Deane, F. P. (2014). Substance use comorbidity among psychiatric inpatients in *low-income settings: A systematic review. Journal of Substance Use, 19(3), 184–190. https://doi.org/10.3109/14659891.2013.770424*

Mensah, J., Baiden, P., & Kyei-Faried, S. (2019). Community mental health policy and practice in East Africa: Emerging priorities. *International Journal of Mental Health*, 48(4), 297–312. https://doi.org/10.1080/00207411.2019.1611905

Molodynski, A., Cusack, C., & Nixon, J. (2017). Mental healthcare in Uganda: Descriptive analysis and prospects for development. *BJPsych International*, 14(4), 96–99. https://doi.org/10.1192/S2056474000002043

NPH Annual Report. (2023). *Ndera Neuropsychiatric Hospital Annual Performance Report 2022–2023*. Kigali: Rwanda Biomedical Centre.

NPH Data. (2023). *Internal hospitalization and patient flow statistics*. Kigali: Ndera Neuropsychiatric Hospital, Ministry of Health.

Olayiwola, S., Adebayo, A. M., & Olowookere, S. A. (2023). Challenges and prospects of mental health services in sub-Saharan Africa. *International Journal of Mental Health Systems, 17*(1), 12. https://doi.org/10.1186/s13033-023-00576-8

Patel, V., Saxena, S., Lund, C., Thornicroft, G., Baingana, F., Bolton, P., ... & UnÜtzer, J. (2022). The Lancet Commission on global mental health and sustainable development. *The Lancet, 392*(10157), 1553–1598. https://doi.org/10.1016/S0140-6736(18)31612-X

Semrau, M., Evans-Lacko, S., Koschorke, M., Ashenafi, L., & Thornicroft, G**.** (2015). Strengthening mental health systems in low- and middle-income countries: The Emerald programme. *BMC Medicine*, 13(1), 1–9. https://doi.org/10.1186/s12916-015-0309-4

Thornicroft, G., & Tansella, M. (2013). The balanced care model for global mental health. *Psychological Medicine*, 43(4), 849–863. https://doi.org/10.1017/S0033291712001420

World Health Organization. (2021). *Guidance on community mental health services: Promoting person-centred and rights-based approaches*. Geneva: World Health Organization. https://www.who.int/publications/i/item/9789240025707

World Health Organization. (2021). *Mental health atlas 2020*. World Health Organization. https://www.who.int/publications/i/item/9789240036703