

ORIGINAL ARTICLE

Date of submission: 11 Aug 2025

Date of acceptance: 8 Dec 2025

Date of Publication: 08 Feb 2026

Correspondence:

Dr. Pawan KB Agrawal

Department of General Practice & Emergency, Chaurjahari Hospital, Rukum West, Nepal

Email: agrawal.pawan@hotmail.com

Agrawal PK, Subedi AJ, Subba N, Giri DB, Gupta P, Parajuli S. Outcome of patients in level II intensive care unit in a rural referral center: a cross-sectional study. J Gen Pract Emerg Med Nepal. 2026 Jun;13(1):1-5.

Online information**DOI:**

<https://doi.org/10.59284/jgpeman365>



Copyright © 2026 by the author(s), wherein the author(s) are the only owners of the copyright of the published content.

Licensing: This published content is distributed under the terms of the Creative Commons Attribution-NonCommercial (CC BY-NC) license, and is free to access on the Journal's website. The author(s) retain ownership of the copyrights and publishing rights without limitations for their content, and they grant others permission to copy, use, print, share, modify, and distribute the article's content even for commercial purposes.

Disclaimer: This publication's claims, opinions, and information are the sole creations of the specific author(s) and contributor(s). Errors in the contents and any repercussions resulting from the use of the information included within are not the responsibility of the publisher, editor, or reviewers. Regarding any jurisdictional assertions in any published articles, their contents, and the author's institutional affiliations, the Journal and its publisher maintain their objectivity.

Outcome of patients in level II intensive care unit in a rural referral center: a cross-sectional study

Pawan Kumar Bajaj Agrawal¹, Arun Jung Subedi², Nimrod Subba³, Dil Bahadur Giri⁴, Priyanka Gupta⁵, Suraj Parajuli⁶

¹Senior Consultant, Department of General Practice & Emergency, ²Senior Consultant, Department of Internal Medicine, ³Senior Consultant, Department of Orthopedics & Trauma Surgery, ⁴Administrator, Chaurjahari Hospital, Rukum West, Nepal; ⁵Consultant, Bluecross Hospital, Kathmandu, Nepal; ⁶Associate Professor, Medical University of the Americas Nevis, West Indies

Abstract

Introduction: Intermediate intensive care units (ICUs) in province-level hospitals in Nepal offer continuous monitoring, inotropic support, and non-mechanical ventilation. Only some of these ICU settings in rural Nepal are functional. These ICUs improve patient outcomes, manage patients until their transfer to advanced ICUs, and reduce unnecessary referrals in terminal illnesses. There were few studies on the performance of urban and advanced-level 3 ICUs in Nepal. These studies were essential for comparing the quality and efficiency of ICUs. The study aimed to describe the admissions and their outcomes in a level 2 ICU in rural Nepal.

Method: A cross-sectional descriptive study was conducted at Chaurjahari Hospital in Rukum West from July 2024 to June 2025. Patient characteristics, primary diagnosis, length of stay, and outcomes were recorded.

Result: Total number of patients admitted to ICU was 71 (0.07%). The numbers of male and female patients were 23 (32.4%) and 48 (67.6%), respectively. Median age was 62 years. Most patients were admitted from the emergency department, which was 61 (86%). COPD was most common diagnosis. The median length of stay was four days. The recovery rate was 63.4% with a referral rate of 14.1%.

Conclusion: Less than one percent of hospital patients required intensive care, with a predominance of female and elderly patients. Most of the patients in the rural ICU came from the emergency department with acute exacerbation of COPD as the most common diagnosis. The length of stay and recovery rate were comparable to those in other ICU settings in the country.

Keywords: Critical care; Intensive care; Mortality, Nepal; Outcome, Recovery; Rural

INTRODUCTION

An intensive care unit (ICU) is a specialized area of the hospital designated for patients with life-threatening illnesses that necessitate continuous monitoring and organ support, such as inotropes and/or mechanical ventilation.^{1,2} ICUs are basically graded into three different levels (Level 1, 2, and 3) depending upon the personnel and services available. Level 1 is the basic form of ICU, which provides continuous monitoring and emergency management to stabilize patients. They are available in municipal hospitals. Level 2 is the intermediate ICU with continuous monitoring and organ support, like inotropes and non-invasive ventilation. They are found in provincial hospitals. Level 3 is the advanced, comprehensive ICU designed for the full spectrum of ICU care and is found in academic hospitals.^{3,4} The quality and outcome of the same level of ICU differ markedly worldwide, especially in low- to middle-income countries, owing to the availability of necessary equipment, medicine, and medical personnel.⁵

In rural and resource-limited settings, only level 1 & level 2 ICUs are feasible. There are very few functional ICU settings in rural Nepal. These ICUs are necessary to improve patient outcomes, reduce unnecessary referrals in terminal illnesses, and ease the social pressure on patients' guardians to make referrals. Hence, they are also cost-effective for both the health system and patients.⁶⁻⁹

However, these rural ICUs often struggle with the availability of human resources, frequent turnover of trained personnel, scarcity of laboratory investigations, drug and equipment supply, maintenance of broken equipment, and unrealistic expectations from patients' visitors. Adverse outcomes are obviously common in these ICUs compared to their urban counterparts.⁴ So, clear communication from treating doctors for ICU patients is indispensable in the era of increasing medico-legal awareness.

It is also necessary to monitor the functioning of these ICUs. A few studies examine ICU performance in Nepal. Most of them have been performed in urban ICUs. These studies are essential for comparing the quality and efficiency of ICUs. However, we have not found any studies on rural ICUs. This study would be useful for other rural and urban ICUs for reference. Therefore, the study aimed to describe the admissions and their outcomes in a level 2 ICU of rural Nepal.

METHOD

This was a descriptive cross-sectional study conducted at Chaurjahari Hospital over 1 year, from July 2024 to June 2025. A purposive sampling technique was used, and all patients admitted to the ICU were included. Chaurjahari is a 100-bed hospital serving the catchment population of around 600,000 from three different districts (Rukum West, Jajarkot, and Salyan). The hospital has a team of four consultants (orthopedics, internal medicine, general

practice, and pediatrics) and seven medical officers, offering services around the clock. It is a comprehensive emergency obstetric and neonatal care center that also provides limb fracture surgeries, general surgical care, basic dental care, ophthalmology services, and physiotherapy. The total number of outpatient visits, emergency visits, and inpatients during the study period was 90,572, 7,519, and 5,523, respectively. And the total number of major surgeries performed during the study period was 730. In addition to a level 2 ICU, the hospital has a separate postoperative ward of 5 beds for surgical cases, a special neonatal care unit of 3 beds, and a pediatric intensive care unit of 2 beds. The level 2 ICU has 3 beds, and a nurse (on shift) is responsible for looking after the patients, with an on-call medical officer. Daily morning and evening rounds are conducted by the concerned consultants, with necessary guidance provided to the on-call doctor. Continuous monitoring and emergency management, with inotropic support and non-invasive mechanical ventilation services, are available in the ICU. Approval for the study was obtained from the hospital administration on 15th July 2024, under reference number 21, to access the necessary de-identified data.

The hospital offers laboratory service, X-ray imaging, and ultrasound services around the clock. The laboratory tests available in the hospital are complete blood count, blood sugar, renal function test, liver function test, serum sodium and potassium levels, lipid profile, rapid diagnostic tests for HIV, hepatitis B, hepatitis C, and syphilis, thyroid function tests, glycated hemoglobin level, and troponin level. Yet, the hospital laboratory lacks prothrombin tests, lactate dehydrogenase levels, blood culture and antibiotic sensitivity testing, and arterial blood gas analysis.

The data on ICU patients were obtained from hospital records. The variables of interest were gender, age, primary diagnosis for ICU admission, source of admission, duration of admission, and outcome. The source of admission was categorized as the outpatient department (OPD), the emergency ward (ER), and the inpatient department (IPD). The main condition responsible for ICU admission was termed the primary diagnosis. The outcomes were noted as transferred out, discharged, discharged on request, referred to the tertiary center, and died. The statistical analysis was performed using Microsoft Excel 2013 (Microsoft Corporation, Redmond, Washington, USA) and Statistical Package for the Social Sciences version 21.0 (IBM Inc., Armonk, New York, USA). The categorical variables were expressed in numbers and percentages. Data normality was assessed graphically using a histogram. Normally distributed data were presented as means, and the median was used for continuous variables that did not meet the normality criterion.

RESULT

The total number of patients admitted to the ICU during the study period was 71 (0.07% of total patients). The numbers

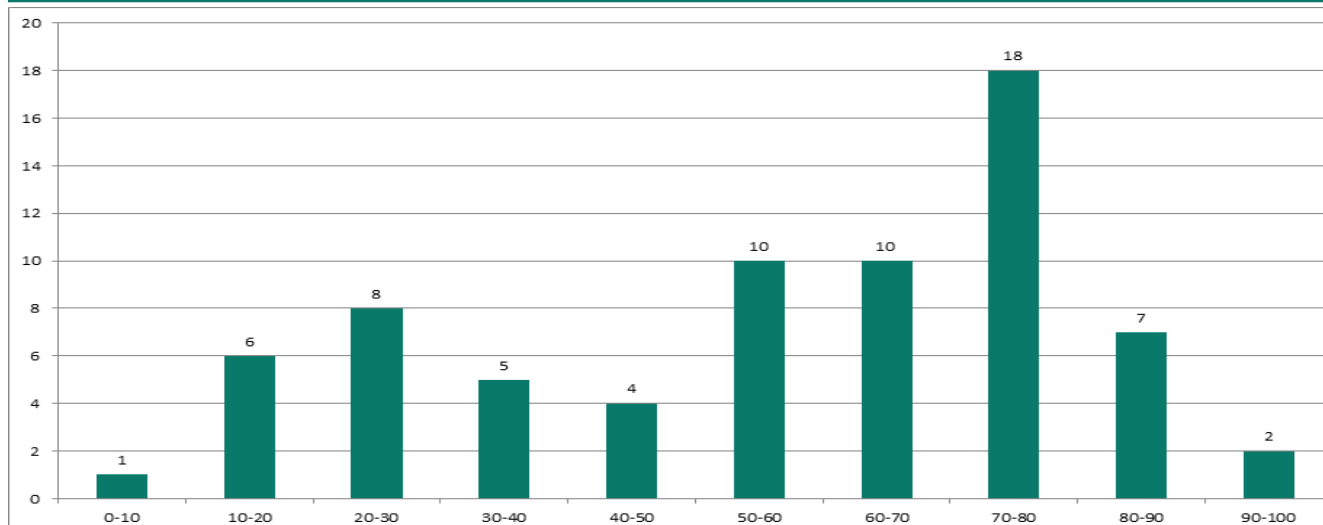


Figure 1. Age distribution of patients admitted in ICU

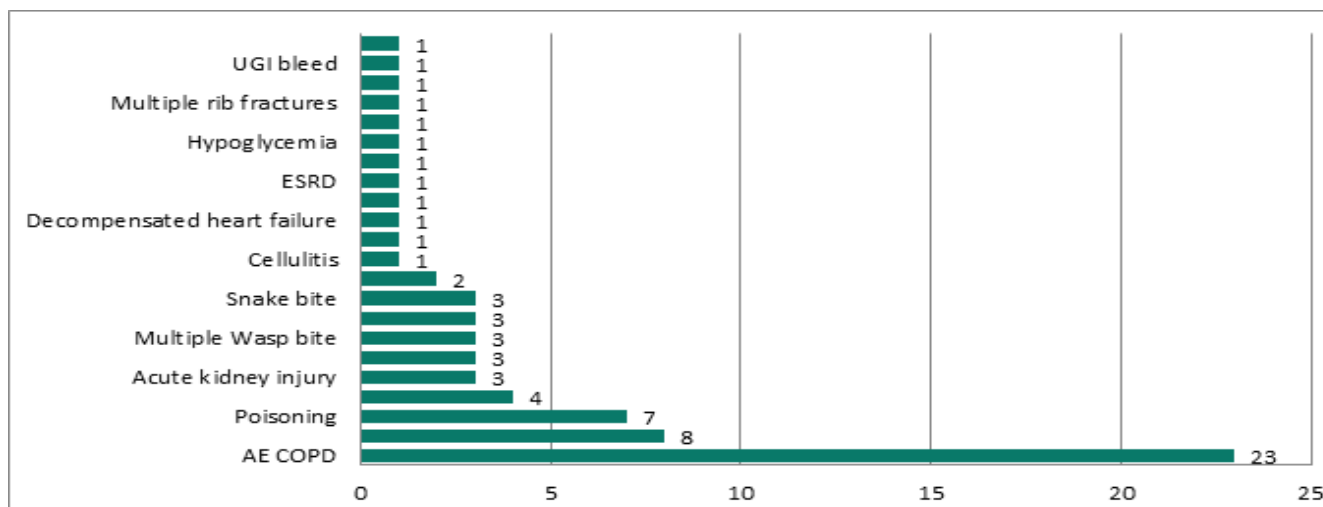


Figure 2. Primary diagnosis in patients admitted to the ICU

of male and female patients were 23 (32.4%) and 48 (67.6%), respectively. Most of the patients were admitted from emergency 61(86%), outpatient department 5(7%), post-operative ward 3(4.2%) and in-patient department 2(2.8%). Figure 1 revealed that patients aged 70 to 80 years were the most among admitted ICU patients. The median age was 62 years with an IQR of 35.5-75.

The most common primary diagnosis for ICU admission was acute exacerbation of chronic obstructive pulmonary disease 23(32.4%), followed by severe pneumonia which was 8(11.3%), poisoning 7(9.9%), hypertensive emergency 4(5.6%), and acute kidney injury 3(4.2%). Only 6(8.4%) were surgical patients (burn, cellulitis, trauma, and three post-caesarean cases). Out of eight cases of severe pneumonia, three were post-caesarean cases with pneumonia as a complication. The median duration of stay in ICU was four days with an IQR of 2.5-7.0. The length of stay ranged from one to nineteen days. Forty-two patients (59.2%) were discharged home after recovery, while 14(19.7%) were discharged at the patients' request. Ten patients (14.1%) were referred to a tertiary center for further care, 3(4.2%)

were transferred out to the inpatient department for continuity of care, and 2(2.8%) died during their stay in ICU.

DISCUSSION

A very small proportion of hospital patients required ICU care. The study showed that 0.07% of the total patients were admitted to the ICU. Female patients outnumbered male patients, unlike in many other studies in tertiary ICU settings.^{1,11,12} However, a study by Abate et al. shared that female patients accounted for 53% of ICU admissions in southern Ethiopia.¹³ This might be because female patients (55,174) were more than male patients (35,398) in overall healthcare utilization in rural hospitals. Men in rural areas often have to move to urban areas or foreign countries to earn a living. This was also evident in total hospital visits, with female patients accounting for the majority. More than half of the patients were aged 60 or older. Mandal et al. at Lumbini Provincial Hospital had similar findings in their study.¹² However, the findings differed from other studies in tertiary settings where patients were predominantly below 60 years of age.^{1,11,13} As already discussed above, the rural

areas are suffering from labor-related migration, so that people who are staying in rural lands are mostly children, females, and old people. Elderly patients with chronic diseases like COPD have recurrent admissions, and hence, patients and their guardians might have accepted the poor prognosis and not sought advanced care in a tertiary center, resulting in referral.

Most of the cases were admitted from the emergency (86%), followed by OPD (7%), post-operative ward (4.2%), and IPD (2.8%). It was similar to the study by Mandal et al., and Keyal et al.^{11,12,15} The referral centers had very sick patients referred to them from primary hospitals who were then transferred to their ICU. The very sick patients in rural areas of low-income countries seldom choose referral from one ICU to another because of the economic liability associated with referral. The tertiary centers, where major critical surgeries were performed, such as neurosurgery and cardiac surgery, accounted for almost half of their cases in the operating room. In these hospitals, the priority could have been given to the patients undergoing major surgeries. The proportion of surgical cases in various studies ranged from 10 to 45%.^{1,5,10,12} Since no major critical surgeries were performed in this rural referral center, there were less surgical cases in ICU. The major surgeries available were cesarean section, appendectomy, hernioplasty, and limb fracture surgeries. These cases were almost properly cared for in the post-operative ward, and only three cases of cesarean section developed severe pneumonia in the post-operative period and were transferred to the ICU. It is unlikely that only 2 cases out of 5,523 IPD admissions deteriorated and were transferred to the ICU. The critical patients, when given the option of continuity of care in the ICU at the same institution, might have chosen to be referred to another tertiary center ICU for better treatment. The treating doctors were obliged to counsel the patients and their families about the nature of the ICU available and the treatment to be expected at tertiary ICU settings. COPD with acute exacerbation topped the list as the most common cause for ICU admission. The result was comparable with the study of Mandal et al.¹² Even as per the annual health report of Nepal 2080/81, COPD and pneumonia were the most common causes of admission to hospitals.

The median duration of stay in our ICU was four days. The length of stay in several studies was similar, ranging from 3 to 5 days.^{1,5,11,12} Around 63% of patients recovered in the ICU and were discharged (including those transferred to IPD). The finding was consistent with other studies. The recovery rate in those studies ranged from 50% to 81%.^{2,10-13,15} We found that 14% were referred to advanced ICU care, 20% were discharged on request, and 3% died during ICU admission. The nearest advanced ICU was a six-hour drive across hilly terrain, and the available ambulances were not comfortable at all. Because of limited human resources, the hospital was not able to send any medic to accompany the patients during these transfers. Among those discharged

on request, some desired to spend the remaining time at home. In some cases, the family could not afford to stay with the patients after realizing there was no hope of improvement, and they had to take care of the livestock at home. In one case of death, it was noticed that the patient was transferred from a tertiary ICU to our ICU. The family had already spent a good fortune on treatment and finally accepted that the illness was terminal, and had brought the patient back home for palliative care.

Despite the best efforts, the study had some limitations. It was a single-center study, so it would be difficult to generalize the findings. The incidence of readmission among those discharged, referred out, and discharged on request was not studied. The patients who were discharged on request were not followed to understand their further outcomes. The study did not determine the proportion of patients receiving various types of care in the ICU (monitoring, ionotrope support, and non-mechanical ventilation), and this might be the scope of further studies.

CONCLUSION

This study found that fewer than 1% of hospital patients required intensive care. Female and elderly patients were predominant in the rural ICU. Most patients in the rural ICU arrived from the emergency department. Non-communicable disease like COPD remained the most common cause of ICU admission. The length of stay and recovery proportion were comparable to those in tertiary ICU settings.

DECLARATIONS

Acknowledgement

We are thankful to all the ICU personnel for facilitating the collection of necessary data and their insight upon patients admitted and to Mr. Ghurka Bahadur Budathoki in the medical record section for hospital data.

Conflict of Interest

None

Funding

None

Ethical Clearance

Received from the hospital administration of Chaurjahari Hospital on 15th July 2024 with reference number 21.

REFERENCES

1. Acharya SP, Bhattarai A, Bhattarai B. An audit of an intensive care unit of a tertiary care hospital. *J Nepal Med Assoc.* 2018 Aug 31;56(212):759. | [PubMed](#) | [Full Text](#) |
2. Acharya SP. Critical care medicine in Nepal: where are we? *Int Health.* 2013 Jun;5(2):92-5. | [PubMed](#) | [Full Text](#) |
3. Waydhas C, Riessen R, Markewitz A, Hoffmann F, Frey L et al. Recommendations on the structure, personal, and organization of intensive care units. *Front Med (Lausanne).* 2023 Jun 7;10:1196060. | [PubMed](#) | [Full Text](#) |

4. Marshall JC, Bosco L, Adhikari NK, Connolly B, Diaz JV, Dorman T, Fowler RA, Meyfroidt G, Nakagawa S, Pelosi P, Vincent JL, Vollman K, Zimmerman J. What is an intensive care unit? A report of the task force of the World Federation of Societies of Intensive and Critical Care Medicine. *J Crit Care*. 2017 Feb;37:270-276. | [PubMed](#) | [Full Text](#) |
5. Paudel A, Acharya SP, Shrestha GS, Shrestha PS, Paneru HR, Sharma S. Admission time and outcomes of patients admitted to intensive care unit in a tertiary hospital in Nepal: an observational study. *J Nepal Soc Crit Care Med*. 2024 Jan 24;2(1):4-9. | [Full Text](#) |
6. Agrawal PK, Gupta P, Parajuli S. Referral situation from a municipal hospital with general practitioner: a cross-sectional study: Referral situation from a municipal Hospital. *J Gen Prac Emerg Med Nepal*. 2023 Aug 30;10(15):13-7. | [Full Text](#) |
7. Ramesh T, Klompas M, Yu H. Improving rural intensive care infrastructure in the USA. *Lancet Respir Med*. 2024 Apr;12(4):268-269. | [PubMed](#) | [Full Text](#) |
8. Agrawal PK, Giri B, Gupta P, Nepali A, Parajuli S. Per Capita Health Expenditure at a Municipal Hospital: Perspective from a General Practice Hospital in Rural Nepal. *J Karnali Acad Health Sci*. 2025 Jun 4;8(1). | [Full Text](#) |
9. Maitra S. Critical care in rural hospitals in the Indian state of West Bengal (WB). *Future Hosp. J*. 2016 Jun 1;3(2):s11. | [PubMed](#) | [Full Text](#) |
10. Koirala S, Ghimire A, Sharma A, Bhattarai B. ICU admission and outcomes in a community-based tertiary care hospital: an audit of one year. *Health Renaissance*. 2011;9(2):83-7. | [Full Text](#) |
11. Keyal NK, Mishra JK, Mahato R, Gupta G, Kanu US, Gupta S, Sharma S. Outcome of a semi-closed mixed intensive care unit in a medical college: A prospective observational study. *J Nepal Soc Crit Care Med*. 2025 Jan 6;3(1):11-6. | [Full Text](#) |
12. Mandal RK, Bhandari N, Gupta U, Paudel S, Yadav KK, Shakya N. Pattern of Patients in Intensive Care Unit in a Tertiary Care Hospital in Lumbini Province Nepal. *Nepal Mediciti Med J*. 2023 Jul 30;4(1):10-5. | [Full Text](#) |
13. Abate SM, Assen S, Yinges M, Basu B. Survival and predictors of mortality among patients admitted to the intensive care units in southern Ethiopia: A multi-center cohort study. *Ann. Med. Surg*. 2021 May 1;65:102318. | [PubMed](#) | [Full Text](#) |
14. Ministry of Health and Population, Department of Health Services. Annual Health Report 2080/81 (2023/24). Kathmandu: Government of Nepal; | cited 2025 Jul 19|. | [Full Text](#) |
15. Khanduri S, Katiyar S, Kishore N, Sodhi R, Aggarwal A. Retrospective review of profile of intensive care unit admissions and outcomes in a tertiary care hospital of Himalayan region. *Int J Res Med Sci*. 2017 Nov;5(11):4715-8. | [Full Text](#) |