JGPEMN
ISSN 2091-279X
eISSN 2362-1168

ORIGINAL ARTICLE

Date of submission: 9 Apr 2024

Date of acceptance: 22 Jun 2024

Date of Publication: 14 Jul 2024

Correspondence:
Dr. Pawan Kumar Bajaj Agrawal
Dept. of General Practice & Emergency, Citycare Hospital, Bardibas, Mahottari, Nepal
Email: agrawal.pawan@hotmail.com

How to cite:
Bajaj Agrawal PK, Giri B, Gupta P, Nepali A, Parajuli S. Utilization of diagnostic services at a municipal hospital in rural Nepal: perspective from a general practitioner-led primary care delivery. J Gen Pract Emerg Med Nepal. 2024 Jun;11(17):62-66.

Online information
DOI:
https://doi.org/10.59284/jgpeman259

Utilization of diagnostic services at a municipal hospital in rural Nepal: Perspective from a general practitioner-led primary care delivery

Pawan Kumar Bajaj Agrawal[1] Baburam Giri[2], Priyanka Gupta[3], Anjan Nepali[4], Suraj Parajuli[5]

[1]Senior Consultant, Dept. of General Practice & Emergency, Citycare Hospital, Bardibas, Mahottari, Nepal; [2]Administrative Officer, NepalMed EV; [3]Consultant, Blue Cross Hospital, Kathmandu, Nepal; [4]Medical Officer, Amppipal Hospital, Gorkha, Nepal; [5]Assoc. Prof., Medical University of the Americas Nevis, West Indies

Abstract

Introduction: Municipal hospitals, being accessible and affordable, are essential to ensure universal health coverage. Several diagnostic services like laboratory investigations, X-ray imaging, ECG and POCUS are used in these primary care settings to ensure quality health delivery. Optimal utilization of diagnostic services is necessary for effective health expenditure in these government institutions which mostly depend upon government funding. In this study, we aimed to reflect upon the temporal trend of utilization of diagnostic services in a rural municipal hospital.

Method: The study was carried out in Amppipal Municipal Hospital, in rural Gorkha over five fiscal years from July 2017 to June 2022. Yearly clinicians' orders for different diagnostic services including laboratory investigations, X-rays, point-of-care ultrasound, and electrocardiogram were recorded. The proportion of total clients undergoing each of these services were evaluated.

Result: The median number and median percentage of total yearly clients undergoing laboratory investigations, X-rays, electrocardiogram, and point-of-care ultrasound was respectively 7803(31.5%), 2385(11.1%), 279(1.3%) and 725(3.6%). The utilization of diagnostic services increased over the years. The net increment over five years in laboratory testing rate, X-rays, electrocardiogram, and point-of-care ultrasound was 35.15%, 80.00%, 776.29% and 85.49% respectively. While, the net increment in the number of total annual clients over five years was 48.19%.

Conclusion: This study reflected upon the utilization behavior of different diagnostic services in a primary care municipal hospital and suggested the trend of increasing utilization of all available diagnostic services over the years. It would serve as a reference to health system administrators and policy makers working in primary care service delivery.

Keywords: Electrocardiogram; General practice; Investigations; Municipal hospital; Ultrasonography

INTRODUCTION

Moving forward with federalism, Nepal has three tiers of public hospitals namely municipal, provincial, and central. Municipal hospitals are the first point of contact for most patients who need some type of investigations; including laboratory investigations, X-ray or ultrasound imaging, admissions and some kind of surgeries.[1] These primary care centers have an important role in screening, early diagnosis, treatment of diseases and reduction of complications. These centers are the most affordable and accessible among all the three tiers of hospitals.[2-4] Hence, it is inevitable to strengthen these hospitals with provision of general practitioners (GPs) and necessary diagnostic services, and thereby increase efficiency and effectiveness of health expenditure at these centers.[4,5]

The government has been planning to operate municipal hospitals in each of the 753 municipalities across the country. Most of these hospitals have basic laboratory investigations, X-ray imaging system, point of care ultrasound (POCUS) performed by GPs or senior medical officers and electrocardiogram (ECG) facilities for screening, diagnosis and treatment evaluation purposes. There are national guidelines that determine the extent of diagnostic services including the type of laboratory tests that should be provided in these hospitals.[6] Utilization of these diagnostic services has a direct impact on quality of service, service time, patient satisfaction, workload and cost of health service delivery. Similarly, availability of GPs, admission facility, 24-hour emergency services, provision of surgical services and rising lawsuits against medical personnel also dictate increased use of diagnostic services.

However, it is difficult to ascertain the appropriate utilization of these diagnostic services. Regular assessment can help in optimal use of diagnostic services with positive impact on patient health and cost management. Very few studies have estimated the pattern of service utilization in these primary care centers.[7,8] Hence we aimed to study the temporal trend of service utilization at a primary care municipal hospital in Nepal.

METHOD

This was a descriptive cross-sectional study in Amppipal Hospital, Gorkha over the duration of five fiscal years (FY) from July 2017 to June 2022. Amppipal Hospital is a primary care hospital in rural Gorkha as per recent national categorization of government healthcare institutions with municipal population of 37,409 as per census of 2021.[9] It is a 50-bedded hospital with a team of three medical officers under the leadership of a senior consultant medical generalist (GP). It is a comprehensive emergency obstetric and neonatal care center and also provides general orthopedic and surgical care services, basic dental care, ophthalmology care and physiotherapy services. Approval was obtained from the hospital administration to access the necessary data for this study.

The data about clients and diagnostic services was obtained from hospital records. Multiple visits of the same patients were considered as individual patients. The laboratory tests available in the hospital were complete blood count, blood sugar, renal function test, liver function test, serum sodium and potassium level, lipid profile, rapid diagnostic tests for HIV, hepatitis B, hepatitis C and syphilis, thyroid function tests, glycated hemoglobin level, point of care test for troponin I and prothrombin time. The hospital had a 300 mA computed radiography system, 3 channel ECG machine and portable USG machine with color Doppler feature. Senior clinicians performed POCUS under supervision of GP.

The proportion of individual diagnostic services among total clients was calculated and compared. The statistical analysis was performed using Microsoft Excel 2013 (Microsoft Corporation, Redmond, Washington, USA). The categorical variables were expressed in numbers and percentages. Normality of the data was determined graphically using histogram. Normally distributed data was presented in terms of mean, and the median was used to present the continuous variables not fulfilling the criterion of normal distribution.

RESULT

Figure 1 showed that the number of total clients visiting the hospitals increased over the years from 19,062 in FY 2017/18 to 28,249 in FY 2021/22. The net increment in the number of total clients over five years was 48.19%.

The median number and median percentage of the total clients undergoing laboratory investigations was 7,803 and 31.5% with IQR of 23.3-37.0. Similarly, 2,385 (11.1%; IQR 9.0-15.1) of the total clients every year underwent X-ray imaging. POCUS was provided to 725 (3.6%; IQR of 2.4-5.3) of the total annual clients by the practicing GP. Two hundred and seventy-nine (1.3%; IQR of 0.5-4.1) of the total annual clients were prescribed ECGs. The net increment over five years in lab testing rate, X-ray imaging, POCUS and ECG was 35.15%, 80.00%, 85.49% and 776.29% respectively. (Figure 2)

DISCUSSION

The number of patients seeking care at the hospital increased over the duration of study. Numerous internal and external factors influenced the number of patients visiting this municipal hospital. Availability of a GP as a senior medical leader, minimum interruption in diagnostic services and treatment, and availability of a wide variety of surgical services attracted the community people to seek health services at this hospital. Quality of care and patient experiences also increased footfalls in the hospital. At Amppipal, the patients had to verify their insurance amount only once during registration of visit for the entire duration of outpatient or inpatient service,

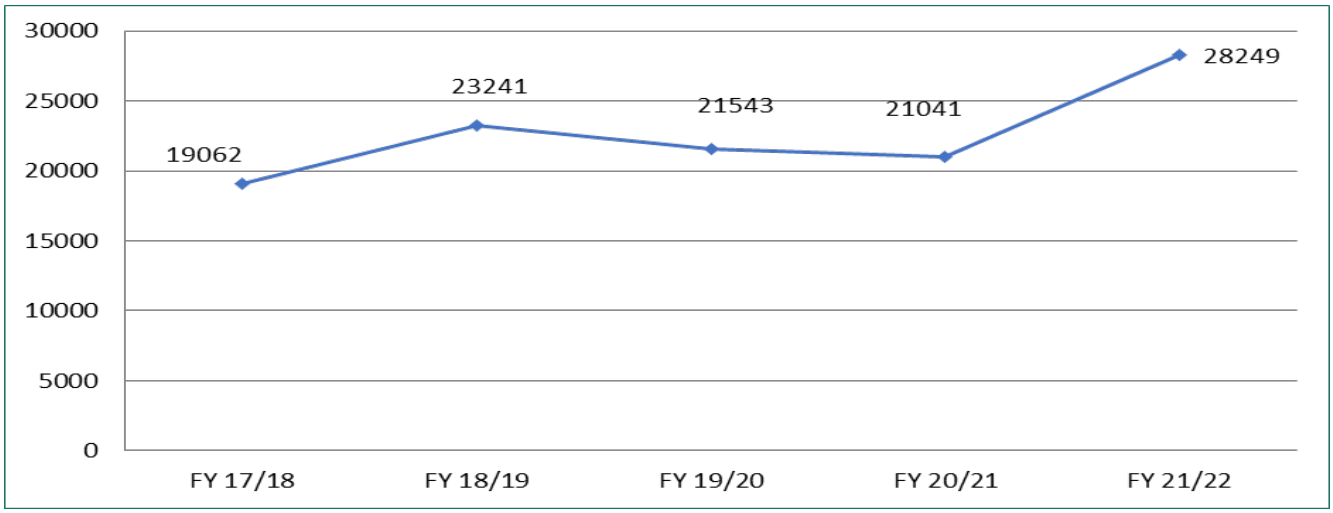

Figure 1. Trend of total number of patient visits over five fiscal years.

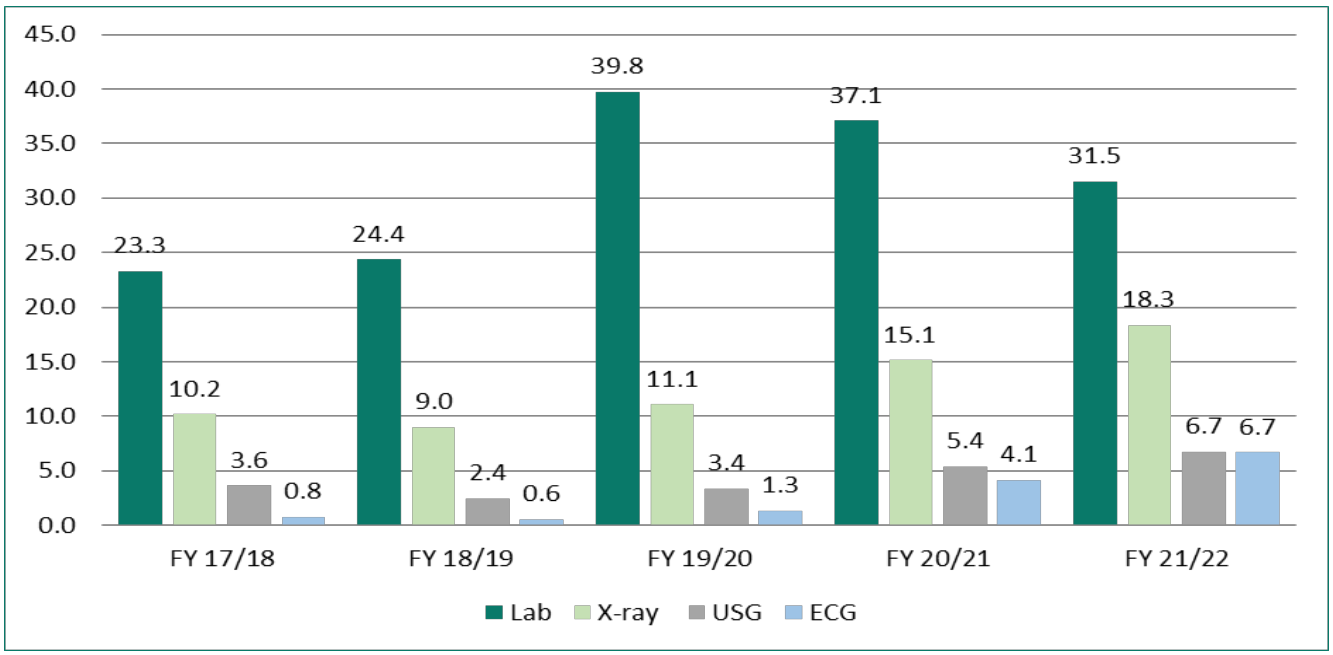

Figure 2. Proportion of patients undergoing each type of diagnostic service in every fiscal year.

resulting in decreased waiting in queues and they did not have to pay any additional amount if they were insured. The referral rate from this hospital was low which might indicate quality of service and increased patient satisfaction.[4] However, Amppipal had pitched road access only after 2022. Amppipal Hospital is situated at a distance of 15 kilometers from the densely populated area of the municipality. Public transportation was not available. The hospital operated a community bus for ease of access to community people. However, some municipal hospitals might have enormous footfalls compared to Amppipal.[5,10]

Extent and need of availability of diagnostic services, despite the national guidelines, depend upon the availability of clinicians, their skill sets and municipality funds. Municipal hospitals need basic laboratory investigations, computed or digital radiography imaging, ECG and ultrasound machines to ensure quality health service and fulfill community health needs. Laboratory investigations are among the most commonly used diagnostic modalities and influence up to 70% of critical decisions of medications, admission and discharge.[11] Laboratory services cost approximately five percent of total hospital expenditure. Appropriate utilization of laboratory tests in municipal hospitals is essential to reduce service time, workload and reduce health expenditure of primary care delivery.[12] Schumacher et al suggested that the overall laboratory testing rate in primary care was 20.2% which was lower compared to ours.[7] Similarly Sullivan et al realized increased utilization of diagnostic services including laboratory tests over the years in UK primary care.[8] The rise in lawsuits against medical professionals and thereby upsurge of defensive medicine had resulted in increased use of diagnostic modalities.[13,14] Yet, a balance needs to be established to ensure and

strengthen primary care service delivery. Figure 2 showed that the laboratory testing rate decreased over three years from FY 19/20 to FY 21/22. Implementation of electronic health records in FY 19/20 and henceforth efforts to digitalize the patients' data could be the major responsible factor. Once sufficient data of the patients was recorded in electronic health records in FY 19/20 leading to a surge in laboratory testing rate, it subsequently decreased the need of repeated testing because of ease of data retrieval and data comparison over time.

In primary care consultations, X-ray examinations are essential to diagnose several conditions including pneumonia, fractures and chronic pains. X-rays play an important role in determining the severity of some illness and conditions and deciding referral. Bergus, et al in 1995 suggested the use of X-rays in 2.61% of primary care visits.[15] Since this was a very old study, it could be expected that the present-day utilization is higher than their conclusion. It is difficult to maintain continuous service of X-ray imaging after initial installation because of frequent electricity disruption and fluctuation in voltages especially in rural municipalities. At the same time, it is known that a large amount of radiation can damage human tissues. So, a balance needs to be met to ensure no harm to the patient.

ECG is the most commonly ordered cardiac test in primary care. ECG is necessary in patients with chest pain, dyspnea, palpitations and syncope. It is useful in diagnosis of cardiovascular events and arrhythmias.[16] Performing ECG test is quick and painless. A study in primary care suggested that 3.4% of the patients underwent ECG screening.[17] It was higher compared to the findings of our study. It is necessary to understand that overutilization of ECG might lead to emotional distress and necessitate further tests and referral because of false positive results.[16]

POCUS is evolving as a global standard of care and is useful in detecting several pathologies present in primary care clinics.[18,19] POCUS is useful in screening of high-risk pregnancies, abdominal trauma, pleural effusions and soft tissue foreign bodies. GPs in Nepal have only one month of dedicated ultrasound training while they learn the essentials of POCUS during their three months of training in emergency department and primary hospital postings. Nepal medical council has suggested three additional months of training for GPs to improve their POCUS performance, yet we lack a formal pathway for this kind of training in Nepal. A study by Anderson et al demonstrated that 8.6% of the patient consultations in GP clinics underwent POCUS.[19] The percentage was higher compared to this study.

Comparison studies in similar municipal hospitals would have been more helpful to conclude appropriate utilization of diagnostic services in our primary care. Burden of different diseases in the hospital would have provided a better insight into the rationale of utilization. Testing rates comparing the emergency, outpatient visits and inpatient admissions would have helped in realizing the appropriate use.

CONCLUSION

This study suggested the increased footfalls of community people in municipal hospitals for their health needs. The study reflected upon the utilization behavior of different diagnostic services in a primary care hospital with provision of a GP and suggested increased utilization of all available diagnostic services over the years. The study, however, could not determine if the utilization of diagnostic services was appropriate, yet it would serve as a reference to health system, administrators and policy makers working in primary care service delivery.

DECLARATIONS

Acknowledgement

We are thankful to all the personnel in the respective clinical department for facilitating the collection of necessary data and their insight upon service utilization.

Conflict of Interest

None

Funding

None

REFERENCES

1. Wasti SP, Van Teijlingen E, Rushton S, Subedi M, Simkhada P, Balen J. Overcoming the challenges facing Nepal's health system during federalisation: an analysis of health system building blocks. Health Res Policy Sys. 2023;21(1):117. | PubMed | Full Text |
2. Lee H, Jo H, Karmacharya BM, Sharma B, Shrestha P, Satyal P, et al. Factors affecting Nepalese rural dwellers' choice of first-contact health facility: a cross-sectional survey. J Glob Health Rep. 2023;7. | Full Text | DOI |
3. Adhikari B, Mishra SR, Schwarz R. Transforming Nepal's primary health care delivery system in global health era: addressing historical and current implementation challenges. Global Health. 2022;18(1):8. | PubMed | Full Text |
4. Agrawal PK, Gupta P, Parajuli S. Referral situation from a municipal hospital with general practitioner: a cross-sectional study. J Gen Prac Emerg Med Nepal. 2023;10(15):13-7. | DOI |
5. Gauchan B, Mehanni S, Agrawal P, Pathak M, Dhungana S. Role of the general practitioner in improving rural healthcare access: a case from Nepal. Hum Resour Health. 2018;16:1-8. | PubMed | DOI |
6. Quality Standards & Regulation Division, Ministry of Health & Population. Minimum service standards: checklist to identify the gaps in quality improvement of primary hospitals. Kathmandu: Ministry of Health & Population; 2018. | Full Text |
7. Schumacher LD, Jäger L, Meier R, Rachamin Y, Senn O, Rosemann T, et al. Trends and between-physician variation in laboratory testing: a retrospective longitudinal study in general practice. J Clin Med. 2020;9(6):1787. | PubMed |

DOI |
8. O'Sullivan JW, Stevens S, Hobbs FR, Salisbury C, Little P, Goldacre B, et al. Temporal trends in use of tests in UK primary care, 2000-15: retrospective analysis of 250 million tests. BMJ. 2018;363.k4666. | PubMed | DOI |
9. Ministry of Health, Nepal. Categorization of health facilities as per health infrastructure development standards 2074 (BS). Kathmandu: Ministry of Health & Population; 2017. 33p. | Full Text |
10. Schwarz R, Nepal P, Acharya B, Adhikari SR, Aryal A, Basnett I, et al. Expenses and national insurance payments at a municipal-level hospital in rural Nepal: implications for strategic purchasing and universal health coverage. 2020. Preprint. (Version 1) available at Research Square. | Full Text |
11. Forsman RW. Why is the laboratory an afterthought for managed care organizations? Clin Chem. 1996;42(5):813-6. | PubMed | Full Text |
12. O'Sullivan JW, Albasri A, Nicholson BD, Perera R, Aronson JK, Roberts N, et al. Overtesting and undertesting in primary care: a systematic review and meta-analysis. BMJ Open. 2018;8(2):e018557. | PubMed | Full Text |
13. Plebani M. Defensive medicine and diagnostic testing. Diagnosis. 2014;1(2):151-4. | PubMed | Full Text |
14. Al Awar S, Ucenic TE, Elbiss H. The practice of defensive medicine among physicians in the United Arab Emirates: A clinician survey. Medicine. 2023;102(34):e34701. | PubMed | Full Text |
15. Bergus GR, Franken EA, Koch TJ, Smith WL, Evans ER, Berbaum KS. Radiologic interpretation by family physicians in an office practice setting. J Fam Prac. 1995;41:352. | PubMed | Full Text |
16. Harskamp RE. Electrocardiographic screening in primary care for cardiovascular disease risk and atrial fibrillation. Prim Health Care Res Dev. 2019;20:e101. | PubMed | Full Text |
17. Wolff AR, Long S, McComb JM, Richley D, Mercer P. The gap between training and provision: a primary-care based ECG survey in North-East England. Br J Cardiol. 2012;19(1):38. | Full Text |
18. Murphy SD. Opinion: The use of point-of-care sonography in primary care: An ethical perspective. S Afr Fam Pract. 2022;64(1). | PubMed | Full Text |
19. Andersen CA, Brodersen J, Davidsen AS, Graumann O, Jensen MB. Use and impact of point-of-care ultrasonography in general practice: a prospective observational study. BMJ Open. 2020;10(9):e.37664. | PubMed | Full Text