MSW MANAGEMENT -Multidisciplinary, Scientific Work and Management Journal
ISSN: 1053-7899
Vol. 36 Issue 1s, 2026, Pages: 975-978

MINIMIZING REVENUE LEAKAGE IN PATIENT OPENED EPISODES: A DESCRIPTIVE STUDY IN A TERTIARY CARE MULTISPECIALTY HOSPITAL IN BANGALORE

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Abstract – Revenue integrity represents a critical component of financial sustainability within modern healthcare organizations. Hospitals function in a highly complex environment where the delivery of clinical care must be effectively aligned with financial and administrative processes. In outpatient departments (OPD), patient episodes are generated at the time of registration for consultations, procedures, diagnostic investigations, or treatment services. Ideally, all services provided during a patient episode should be accurately documented, appropriately coded, billed, and closed within a defined timeframe. However, operational inefficiencies, gaps in clinical documentation, fragmented workflows, and system-related limitations often result in episodes being generated but remaining either unbilled or partially billed. Such unclosed episodes contribute significantly to revenue leakage, reduced cash flow, and diminished financial transparency. This descriptive study was conducted in a tertiary care multispecialty hospital in Bangalore to assess the magnitude, trends, and underlying causes of unbilled and partially billed OPD episodes. A total of 4,087 OPD cases were reviewed over a three-month period from September to November, of which 560 cases were identified as either unbilled or partially billed. Trend analysis revealed a persistent occurrence of unbilled cases across all three months, with the associated revenue loss increasing from ₹77,660 in September to ₹92,600 in November. Unpaid bills constituted 84% of the total revenue leakage, while uncollected service charges and charges not applied in accordance with physician orders each accounted for 8%. The findings indicate that outstanding patient dues and physician-directed non-billable procedures are the primary contributors to revenue leakage. Additional contributing factors include uncertainty in procedure coding, delays in order entry, multiple process handoffs, reliance on manual communication, and high patient volumes within the OPD setting. To mitigate these challenges, structured interventions such as the implementation of standardized procedure packages, mandatory justification prompts within the billing system, automation-enabled alerts, and regular audit mechanisms are recommended. These measures have the potential to reduce revenue leakage by approximately 30–50% within a relatively short operational period. Strengthening charge capture processes will enhance billing accuracy, improve cash flow stability, and support the long-term financial sustainability of healthcare institutions.
Keywords: Revenue Integrity, Revenue Leakage, Outpatient Department (OPD) Billing, Charge Capture, Hospital Revenue Cycle Management, Billing Accuracy, Healthcare Financial Management.

1. INTRODUCTION:

Revenue Cycle Management (RCM) encompasses all processes involved in documenting, managing, and collecting revenue generated from patient care services. It begins with patient registration and extends through clinical documentation, coding, billing, and the final receipt of payment. In high-volume OPD environments, minor workflow disruptions or delays can result in missed charges and unresolved patient episodes. These unbilled or partially billed cases commonly arise due to delays in documentation, communication gaps, or heavy patient workload. Systematic review of such episodes assists in identifying areas of revenue leakage and provides insights for improving both operational efficiency and financial performance.

2. A STUDY ON EPISODE RAISED BUT NOT BILLED IN PATIENT OPEN EPISODE

In hospital operations, managing patient episodes and billing is a key part of keeping things running smoothly. At this hospital, the billing process is handled carefully and precisely, ensuring that every service is correctly recorded and managed. A patient episode is raised when a patient is registered for consultation, investigation, procedure, or treatment, and billing should ideally be completed once services are rendered. However, in practice, many patient episodes remain open even after services are provided, and the corresponding charges are not billed — this situation is referred to as episodes raised but not billed in patient open episodes.Errors such as unbilled and partially billed services have been observed due to multiple interrelated factors. From a manpower perspective, procedure code uncertainty among nurses, lack of supervision, and reliance on manual communication with the billing team contribute to missed charges. Physician-directed non-billable procedures further add to unbilled episodes. From a material standpoint, the use of non-billable items results in services not being captured for billing. Method-related gaps, including multiple handoffs, delayed order entry, and post-service payment processes, lead to incomplete episode closure. Additionally, environmental factors such as a crowded OPD increase the likelihood of documentation and billing lapses. Collectively, these factors result in unbilled open episodes within the system.The issue of unbilled and open episodes, arising from procedure code uncertainty among nurses, delayed order entry during peak hours, multiple handoffs, use of non-billable items, physician-directed non-billable procedures, and high OPD workload, affects both hospital operations and financial performance. Hence, studying episodes raised but not billed in patient open episodes is essential to identify root causes, quantify revenue leakage, and assess workflow inefficiencies impacting financial performance. The implementation of focused interventions such as standardized procedure packages, quick code selection, mandatory no-charge justification prompts, and continuous staff education on correct procedure charging strengthens charge capture and billing compliance. These measures directly support improved revenue realization, reduced revenue leakage, faster episode closure, improved cash flow, and enhanced financial visibility for management, thereby strengthening overall hospital revenue cycle performance.

3. OBJECTIVES:

- To examine OPD episode registration and billing protocols in order to identify gaps in charge capture during high-volume workflows.
- To analyze the factors contributing to unbilled procedures and unresolved patient episodes.
- To propose practical interventions to reduce revenue leakage by 30–50% within the next three months and improve billing accuracy.

4. REVIEW OF LITERATURE

2014 – Lee, J. – Denial Management and Revenue Loss : Lee analyzed how improper management of denied claims leads to unbilled or delayed reimbursements. Hospitals with structured denial management programs experienced fewer lost revenues. The study emphasized that procedural improvements and systematic follow-up are essential to reduce unbilled episodes caused by claim denials.

2015 – Thomas, R. – Staff Communication & Billing Efficiency: Thomas found that poor communication between nurses, physicians, and billing staff significantly increases missed billing opportunities. The study stressed that effective staff coordination and training programs are essential to ensure accurate charge capture and reduce unbilled episodes.

2016 – Sharma, V. – RCM Automation Reduces Errors : Sharma demonstrated that automation in charge capture and billing significantly decreases unbilled services. Automated systems provide real-time monitoring and alerts for missed charges, improving accuracy. The study supported the adoption of automated RCM systems as a key strategy to enhance revenue integrity.

2017 – Kim, S. – Impact of Staff Shortages on Billing : Kim found that staff shortages are correlated with increased errors in charge capture and billing. Adequate staffing and proper workload distribution were shown to improve billing accuracy. The research highlighted human resource constraints as a critical factor in unbilled episodes and revenue leakage.

2018 – White, J. – Point-of-Care Charge Capture : White demonstrated that capturing charges at the point of service reduces missed billing opportunities. Direct charge entry at the point of care increases completeness, reduces human error, and improves revenue capture. The study highlighted operational interventions as an effective strategy to minimize unbilled episodes.

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2019 – Choi, M. – Charge Capture Solutions in U.S. Hospitals : Choi found that implementing automated charge capture systems reduced missed charges by 25–30%. Technology improved billing efficiency, minimized human error, and enhanced revenue cycle management. The study highlighted automation as a key strategy to address unbilled episode.

2020 – Kim, D. – RCM Dashboard Implementation : Kim highlighted the benefits of real-time dashboards in tracking unbilled services. Dashboards allowed hospitals to identify gaps promptly, improve accountability, and enhance workflow monitoring. The study emphasized technology as a critical tool for preventing revenue leakage.

2021 – AMA Report – Physician Engagement in RCM : The AMA report emphasized that active physician involvement in revenue cycle management reduces missed charges and improves charge capture accuracy. Engaged clinicians contributed to better documentation practices, timely order entry, and accurate billing. The study highlighted clinician accountability as a critical factor in preventing unbilled episodes.

2022 – Billize AI – Best Practices in RCM : Billize AI found that automation and standardized procedures significantly reduce missed charges. Hospitals implementing best practices, including real-time monitoring and staff training, improved financial performance and minimized revenue leakage. The study reinforced the importance of technology and process standardization in preventing unbilled episodes 2023–2025: Current Trends & Quantification of Unbilled Episodes

2023 – Atluri & Thummisetti – Optimizing RCM in Healthcare : This study highlighted that charge navigator systems and integrated RCM solutions significantly reduce missed billing opportunities. Hospitals adopting these systems reported higher revenue capture rates and improved workflow efficiency. The research emphasizes the role of advanced RCM technology in minimizing unbilled episodes and ensuring accurate financial performance.

2024 – RevCycle PowerPro – Medical Coding Errors and Revenue Leakage: RevCycle PowerPro identified coding errors and missed charge entries as silent revenue losses. The study recommended automation, regular audits, and monitoring systems to prevent financial losses. Accurate coding and real-time tracking were shown to be essential in minimizing unbilled episode

2024 – International Journal of Science & Research – Impact of RCM on Financial Stability: This study found that integrated RCM systems improve billing accuracy, reduce revenue leakage, and enhance accountability. Hospitals with structured systems demonstrated better financial stability and fewer missed charges. The research emphasizes the direct link between organized RCM practices and hospital financial performance.

2025 – Huntington Bank Report – Revenue Loss Estimates : This report indicated that hospitals lose billions annually due to unbilled or missed charges. Proper workflow, documentation, and system checks were recommended to minimize revenue leakage. The study highlights the enormous financial impact of unbilled episodes on hospital operations.

2025 – Assurance Healthcare Advisors – Strategies to Reduce Revenue Leakage : Assurance Healthcare Advisors emphasized that charge capture, documentation, denial management, and staff training significantly reduce unbilled episodes. Hospitals implementing these strategies improved financial performance and operational efficiency, demonstrating effective interventions to prevent revenue loss

2025 – Helixbeat – Revenue Integrity Implementation : Helixbeat highlighted that hospitals employing real-time monitoring, accountability mechanisms, and automated alerts reduced unbilled episodes. The study demonstrated that structured revenue integrity programs are critical for accurate billing, improved compliance, and overall financial health of healthcare institutions.

5.METHODOLOGY:

This study adopts a descriptive research design to examine unbilled and partially billed episodes within the hospital billing system and to identify factors contributing to incomplete billing. Descriptive research is a scientific method employed to systematically observe, record, and analyse information about a subject without influencing or altering it in any way. Its primary objective is to provide an accurate and detailed snapshot of a particular phenomenon, process, or situation. In this study, the occurrence of episodes raised but not billed in the hospital billing system was observed and documented. Data were gathered through manual review of treatment room registers and secondary data obtained from the Hospital Information System (HIS). Out of a total of 4,087 OPD cases, 560 unbilled and partially billed cases were selected for analysis. A census sampling approach was applied, whereby all identified cases were included in the study. The analysis facilitated the identification of key contributing factors, including outstanding patient dues, physician-directed non-billable procedures, and operational workflow inefficiencies.

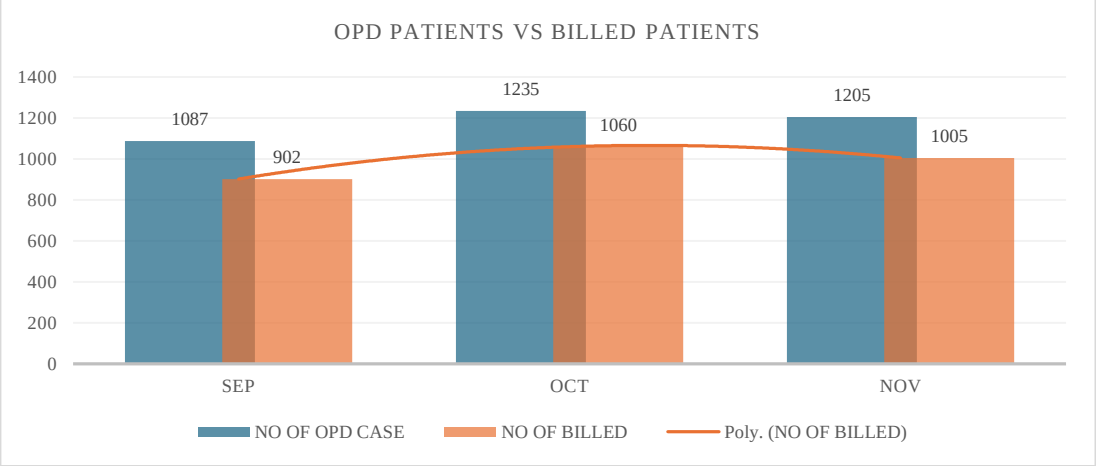
6.ANALYSIS

6.1 TREND ANALYSIS OF BILLED AND UNBILLED OPD CASES:

Table 1 : No. of Billed and Unbilled Cases

MONTH	NO OF OPD CASES	NO OF BILLED CASES	NO OF UNBILLED CASES
SEPTEMBER	1087	902	185
OCTOBER	1235	1060	175
NOVEMBER	1205	1005	200

Figure 1: No. of Billed and Unbilled Cases



The bar graph presents the comparison between billed OPD cases and unbilled OPD cases for the months of September, October, and November. In September,out of 1087 OPD cases 902 were billed and 185 cases were unbilled. In October, OPD cases increased to 1235, while unbilled cases slightly decreased to 175. In November, OPD cases were 1205, whereas unbilled cases increased to 200. Overall, the data show that billed cases remained consistently higher than unbilled cases across all three months. However, unbilled cases were present in each month, indicating that a measurable number of OPD encounters were not billed during the study period.

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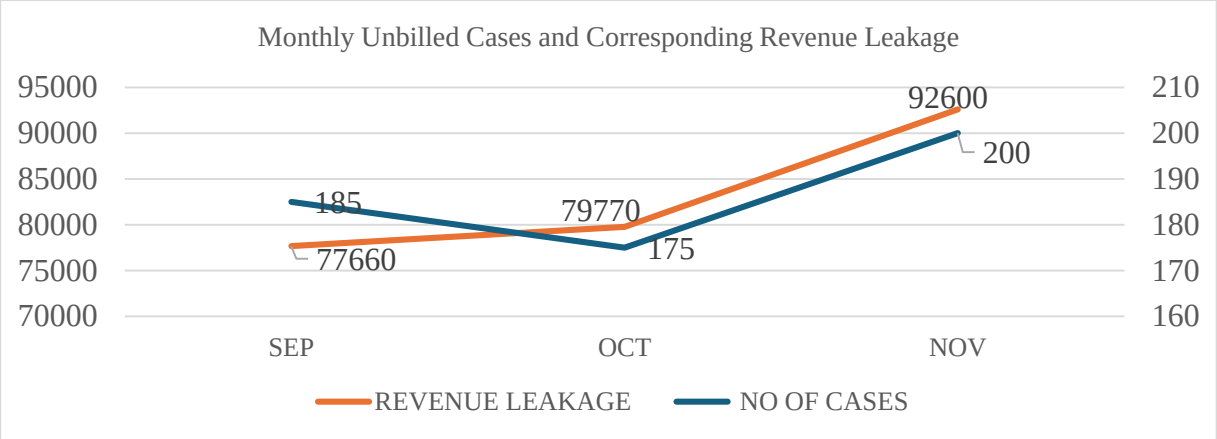
6.2MONTH-WISE TREND OF UNBILLED CASES AND REVENUE LOSS:

Table 2 : No. of Unbilled Cases and Revenue Loss

MONTH	NO OF UNBILLED CASES	REVENUE LOSS
SEPTEMBER	185	₹77,660
OCTOBER	175	₹79,770
NOVEMBER	200	₹92,600

Figure 2 : No. of Unbilled Cases and Revenue Loss



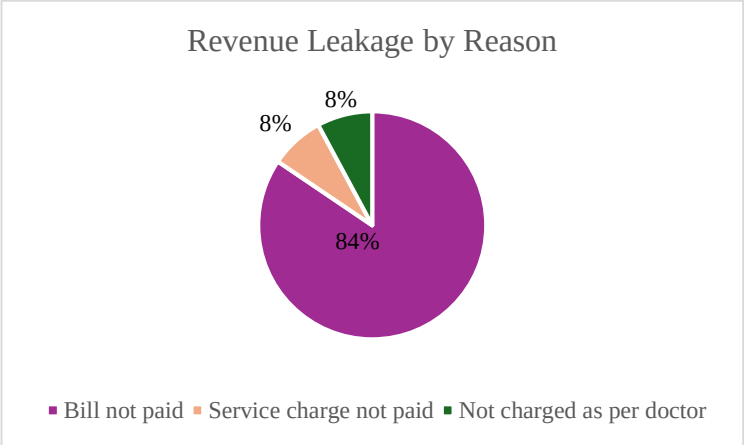
The line graph shows how the number of unbilled cases and the amount of revenue loss changed from September to November. In September, there were 185 unbilled cases and the revenue loss was ₹77,660. In October, unbilled cases came down slightly to 175, but the revenue loss went up to ₹79,770. In November, both unbilled cases and revenue loss increased to 200 cases and ₹92,600. Over all, the graph shows that when unbilled cases increase, the revenue loss also increases. This clearly shows how unbilled cases affect the hospital's income.

6.3 BREAKDOWN OF REVENUE LEAKAGE BY REASON:

Table 3: Reason for Revenue Loss

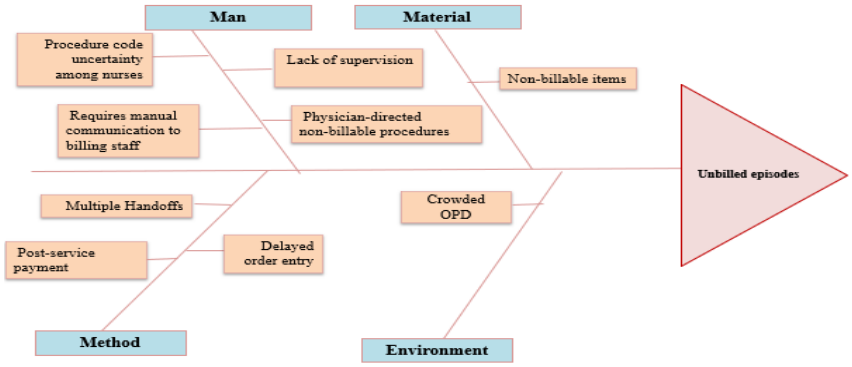
PERCENTAGE	REASON
84%	Bill not paid
8%	Service charge not paid
8%	Not charged as per doctor

Figure 3: Reason for Revenue Loss



The pie chart illustrates the causes of revenue leakage in a healthcare setting. Unpaid bills accounted for the largest portion, representing 84% of total leakage. Service charges not collected contributed 8%, while charges not applied according to the doctor's orders also made up 8%. Overall, the data show that unpaid bills account for the majority of revenue leakage, while service charges not collected and charges not applied as per the doctor's orders each contribute a smaller but notable portion of the total leakage during the study period.

6.4 THE DIAGRAM SHOWS THE ROOT CAUSE ANALYSIS FOR OPEN UNBILLED AND PARTIALLY BILLED EPISODES



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The Ishikawa, or fishbone, diagram is utilized to identify the factors contributing to unbilled episodes in the OPD department. Several causes, including procedure code uncertainty, inadequate supervision, non-billable items, delayed order entry, and high patient volume in the OPD, can affect the billing process and lead to revenue loss. Effective monitoring and improved billing practices are essential to ensure accurate charge capture and minimize revenue leakage.

7. MAJOR FINDINGS:

Billed vs Unbilled OPD Cases

- September – 1087 billed, 185 unbilled: Billed cases were much higher than unbilled cases.
- October – 1235 billed, 175 unbilled: Billed cases increased, while unbilled cases slightly decreased.
- November – 1205 billed, 200 unbilled: Billed cases slightly decreased, and unbilled cases increased.

Unbilled Cases vs Revenue Loss

- September – 185 unbilled cases, ₹77,660 revenue loss: Revenue loss recorded for the month.
- October – 175 unbilled cases, ₹79,770 revenue loss: Revenue loss increased slightly despite fewer unbilled cases.
- November – 200 unbilled cases, ₹92,600 revenue loss: Both unbilled cases and revenue loss increased.

Revenue Leakage Causes

- 84% Unpaid bills: Major revenue loss due to patients not completing payments or missed billing follow-ups.
- 8% Service charges not collected: Revenue lost from minor procedures where service charges were not collected.
- 8% Charges not applied as per doctor's orders: Revenue not charged according to the doctor's instructions.

8. SUGGESTIONS:

- Implement standardized procedure packages to ensure uniform and accurate billing across all OPD procedures.
- Enable quick and appropriate code selection in the Hospital Information System to reduce delays and missed charges.
- Introduce mandatory no-charge justification prompts for all zero-billed services to improve accountability and compliance.
- Conduct regular staff education and training programs on correct procedure charging and billing protocols.
- Strengthen coordination between clinical, billing, and IT teams to ensure timely updating and closure of patient episodes.
- Perform periodic audits of unbilled and partially billed cases to identify gaps and prevent recurrence.
- Enhance system alerts and validation checks to minimize manual errors and improve billing accuracy.

9. CONCLUSION:

Unbilled episodes adversely affect hospital revenue and operational efficiency. This study identifies key causes, including outstanding patient dues and physician-directed non-billable procedures. Additional contributing factors include procedure code uncertainty, inadequate supervision, reliance on manual communication, and delays in order entry. The findings from the analysis of 601 cases highlight critical areas for improvement to enhance billing accuracy and strengthen the hospital's financial performance.

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